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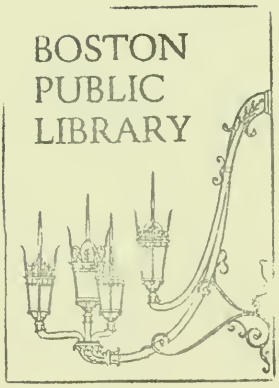

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FACILITIES MASTER PLAN 1982-1992

ENVIRONMENTAL IMPACT ASSESSMENT

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Preliminary Submission

October 1982

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1 INTRODUCTION

1.1 STUDY OVERVIEW

This environmental impact assessment report documents the results of the comprehensive analysis conducted by Environmental Research & Technology, Inc. (ERT) of the proposed ten year (1982-1992) Master Plan for the Tufts University and New England Medical Center (NEMC) complex located contiguous to the City of Boston Central Business District. The project actions comprising the master plan are detailed in the Facilities Master Plan report.

The purpose of the environmental impact assessment is to present to Tufts University and New England Medical Center, City of Boston and Massachusetts public agencies, and those sectors of the general public with an interest in the development of the university and medical complex, sufficient information to allow the monitoring of and planning for the environmental impacts of project related development. The combined information contained in the Master Plan Report and Environmental Impact Assessment enables interested parties to examine the important environmental features of the Master Plan and work cooperatively towards the successful design and implementation of individual project components.

1.2 ANALYSIS SCOPE

The environmental issues that define the scope of the technical analyses were formalized through discussions between Tufts University and New England Medical Center, the Massachusetts Executive Office of Environmental Affairs, the Boston Redevelopment Authority, and the adjacent community. Issues evaluated pertaining to both the physical and manmade environment are summarized in Table 1.2-1. In addition to the impacts associated with the individual analysis components presented in Table 1.2-1, the environmental assessment addressed the impacts generated by the interrelationships between environmental elements (i.e., increased mobile source air quality emissions generated by growth in traffic demand).

Three analysis years were used for the technical evaluations comprising the environmental assessment. Existing (1982) conditions were quantified to describe current environmental characteristics and establish a baseline against which master plan induced changes could be compared for determining impact significance. The second analysis year, 1985, was selected because it represents the date when the near term project development planned by Tufts and NEMC would be completed. The final analysis year, 1992, represents the end point of the ten year planning horizon used in the master planning effort.

1.3 ENVIRONMENTAL ASSESSMENT PROCESS

The technical process used to assess the environmental impacts of the Tufts and New England Medical Center Master Plan is schematically illustrated in Figure 1.3-1. The initial step in the environmental assessment was to develop a data base of sufficient detail to adequately describe existing environmental conditions in the study area. Concurrent with this activity, ERT worked with Tufts University, NEMC and the Master Plan architects to obtain the requisite details on Master Plan project components serving as input to the environmental assessment.

TABLE 1.2-1

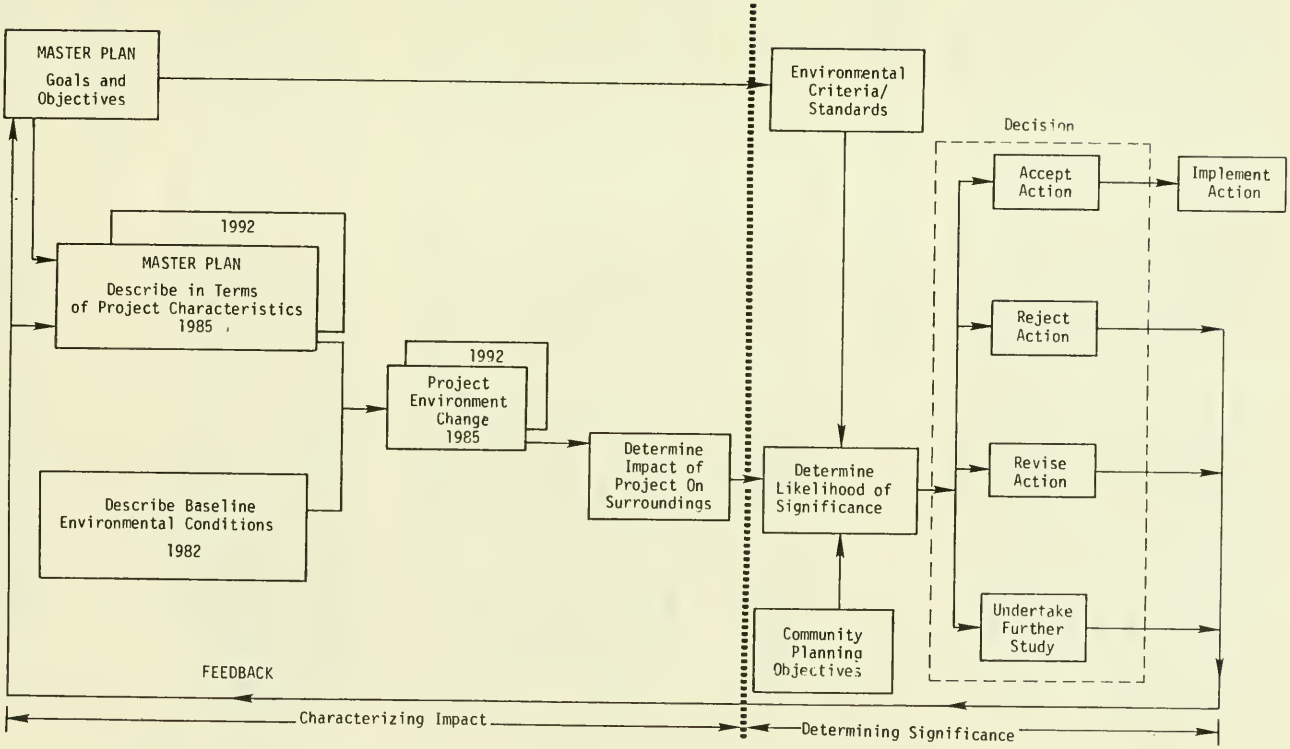
MASTER PLAN AREAS OF ENVIRONMENTAL CONCERN

Environmental Component	Basis of Concern	Assessment Methodology
Land Use	• compatibility with neighborhood land use • facility design • integration of university and medical complex development with planning for neighborhood needs	Comparison with public agency and neighborhood planning goals and development programs; coordination with Master Plan architects
Transportation	• street intersection operational impacts • parking supply-demand • public transportation utilization	Traffic engineering operations analysis
Air Quality	• contribution of increased traffic flow to carbon monoxide concentrations • stationary source emissions from HVAC, generators and incinerators	Modelling of stationary source and mobile source emissions
Noise	• construction equipment operation • physical plant operational noise	Modelling of noise generation for typical construction and physical plant operations
Energy	• relationship of energy requirements to delivery system capabilities • energy conservation measures	Quantification of facility requirements through mechanical engineering analysis; comparison with Boston Edison delivery system capabilities
Infrastructure (water, sewer, solid waste)	• infrastructure requirements in relation to delivery system capabilities • waste disposal control practices	Identification of cumulative Tufts and NEMC requirements; comparison with delivery system capabilities and regulatory requirements

Figure 1.3-1

Tufts University and New England Medical Center

Environmental Impact Assessment Process-Facilities Master Plan



Using the project description data, the environmental impacts associated with each of the individual components of the Master Plan were computed. Project specific impacts were then combined to develop a cumulative impact profile for both 1985 and 1992. The significance of the environmental impacts were then determined through comparison with regulatory standards, public agency criteria, and community planning objectives. Depending upon the outcome of the determination of likelihood of significance, design modifications were made to the projects comprising the Master Plan or mitigation measures defined.

1.4 AGENCY AND COMMUNITY COORDINATION

The data base for the environmental assessment consisted of data collected by ERT during the field surveys completed for the study, project information supplied by Tufts, NEMC and the Master Plan architects, and input supplied by both City of Boston and Massachusetts State Agencies. The communication with the public agencies listed in Table 1.4-1 also helped to direct the technical resources of the study team towards the primary environmental concerns associated with the development proposals contained in the Master Plan. The continuing dialogue with the agencies provided valuable feedback in determining the likelihood of significance of specific environmental impacts. A chronology of public agency contacts made during the course of the study is presented in Appendix A.

In addition to the direct outreach efforts of ERT to the key public agencies, representatives of both Tufts and NEMC have been meeting with community group representatives on a regular basis to incorporate their concerns in the master planning effort. This coordination was viewed as being essential due to the close interaction between Tufts and NEMC, the Chinese community and adjacent business activity.

1.5 REPORT PRESENTATION

The documentation of the environmental assessment contained in this report has been organized according to the analytical sequence

TABLE 1.4-1

Master Plan Environmental Assessment - Public Agency Coordination

Environmental Discipline	Agency Coordination	Coordination Efforts: Policy Guidance	Coordination Efforts: Regulatory Criteria	Coordination Efforts: Dat Inpu
Land Use	Boston Redevelopment Authority	X		X
	Boston Landmarks Commission			X
	Massachusetts Executive Office of Environmental Affairs - MEPA	X		
Transportation	Boston Traffic and Parking	X		X
	Boston Redevelopment Authority			X
	Central Transportation Planning Staff			X
	Massachusetts Bay Transportation Authority			X
Air Quality	Massachusetts Department of Environmental Quality Engineering		X	X
Noise	Boston Air Pollution Control Commission		X	
Energy	Boston Gas Company			X
	Boston Edison Company			X
Infrastructure	MDC-Water Division			X
	MDC-Sewer Division		X	X
	Boston Water and Sewer Commission	X		

followed by the study. Chapter 2 describes the existing (1982) environmental conditions in the study area. Included in Chapter 2 is a description of the existing activity components of both Tufts University and NEMC.

The environmental impacts of the proposed Master Plan are identified in Chapter 3. Cumulative impacts by environmental discipline are presented for both 1985 and 1992. Chapter 4 presents the mitigation measures that have been identified based on the outcome of the significance determination for Master Plan generated impacts. The technical appendices to the report contain a chronology of public agency contacts made during the course of the environmental assessment and key support information used in evaluating the primary environmental issues.

2 ENVIRONMENTAL SETTING

2.1 TUFTS AND NEW ENGLAND MEDICAL CENTER ACTIVITY

The existing facilities comprising the Tufts and New England Medical Center complex are shown in Figure 2.1-1. The Tufts University component of the complex is directed towards medical, dental, graduate basic science, and veterinary school activity. New England Medical Center's primary focus is on the delivery of hospital and associated medical care services. The total building square footage owned by Tufts and New England Medical Center is approximately 1,612,000 square feet. The U.S.D.A.'s Human Nutrition Research Center building consists of an additional 206,500 square feet. Table 2.1-1 provides an overview of the existing facilities in the university and medical complex.

Tufts University Facilities

The Tufts University Medical and Veterinary Schools are basically housed in four (4) reconstructed buildings. These buildings were constructed around the turn of the century and were occupied by various companies in the garment industry.

The M&V Building was purchased in 1945. The building was originally five (5) stories and a full basement. At some time before the Tufts purchase, three (3) additional floors were added. The building has 126,000 gross square feet.

TABLE 2.1-1

1982 EXISTING FACILITIES OVERVIEW

Activity Sector	Building	Approximate Floor Area (Gross Square Feet)
Tufts University	M&V	126,000
	Stearns	54,000
	Arnold	54,000
	South Cove	45,500
	Dental Health Sciences	208,000
	Posner	64,500
		552,000
		(Tufts Subtotal)
New England Medical Center	New Floating Hospital	282,500
	Pratt	55,000
	Farnsworth	100,000
	Ziskind	101,000
	Rehabilitation	55,000
	Center	49,500
	Proger	187,500
	Jackson	24,500
	Classroom	2,000
	Hemenway	10,500
	Boston Dispensary	47,500
	Biewend	145,000
		1,060,000
		(NEMC Subtotal)
USDA	Human Nutrition Research Center	206,500
		1,818,500
		Total All Facilities

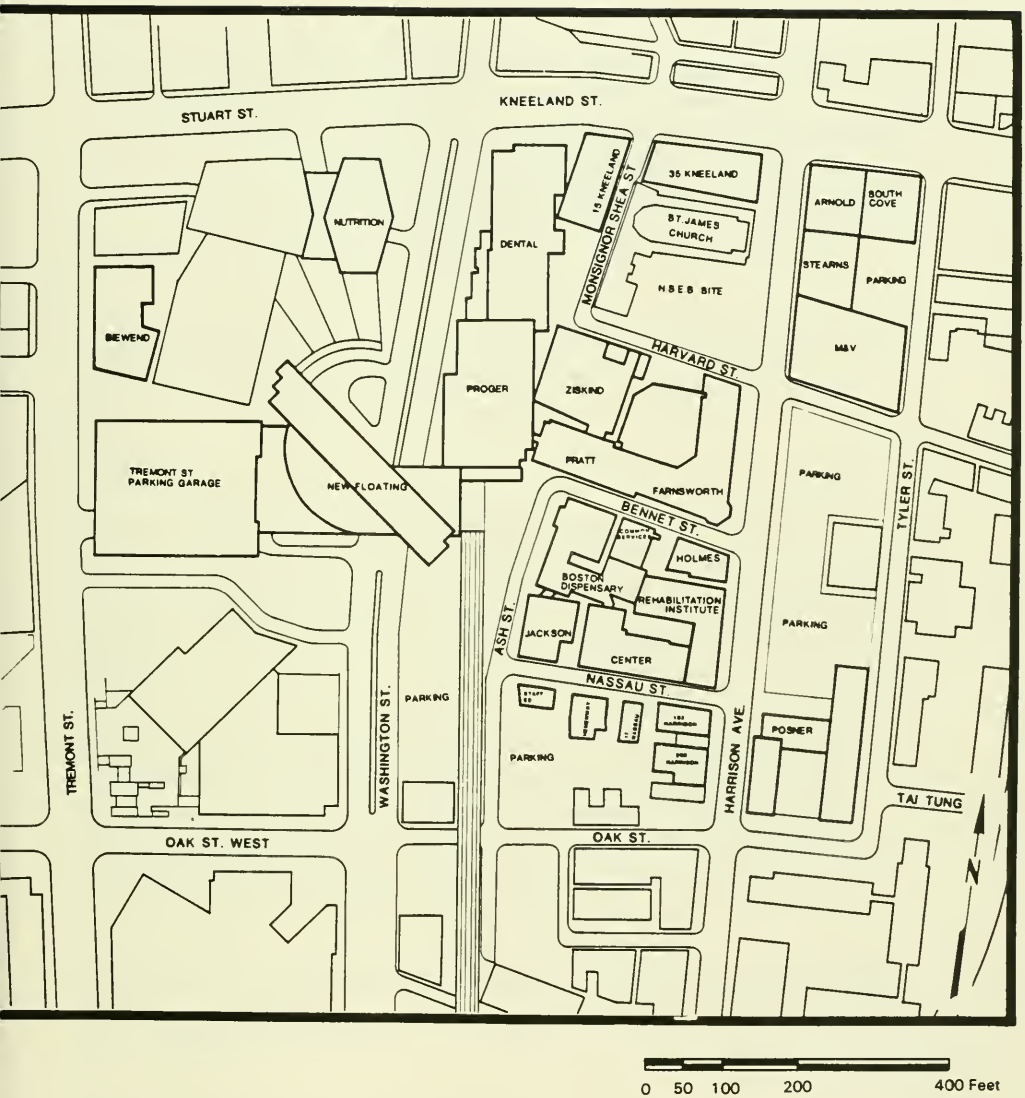


Figure 2.1-1 Existing Tufts and NEMC Facilities

The Stearns Building was purchased and renovated in 1959. The building has eight (8) stories and a basement level for shipping/receiving, and mechanical equipment. The first three floors have been used for classroom space; the remainder primarily research. The fourth floor houses research animals and has a small pathological incinerator. Each floor has 6000 gross square feet for a total building area of 54,000 gross square feet.

The Arnold Building has eight (8) stories and a full basement. The building has 54,000 gross square feet used for commercial space, classrooms, administration and research.

The South Cove Building has eight (8) stories and a full basement. The first floor is occupied by the Personnel and Accounting Departments. The second floor is comprised of teaching laboratories and the remainder of the building faculty research laboratories. Each floor has 6,000 gross square feet with a total of 45,500 gross square feet.

The Dental School facilities are housed in the Dental Health Science Building which was built in 1973, simultaneously with and as a contiguous structure to the Proger Building. The building has 9 stories with 208,000 gross square feet. In addition to Tufts Dental School activity, New England Medical Center uses two floors as inpatient nursing units with a total of 49 beds.

Posner Hall contains 64,500 square feet of space and is used by Tufts for classroom lectures, facilities administration, medical offices, and dormitories.

New England Medical Center Facilities

New England Medical Center occupies nearly 100% of the space in 12 buildings which it owns and varying amounts of space which it rents in 12 other buildings. Buildings owned by the hospital include Pratt, Farnsworth, New Floating Hospital, Ziskind, Rehabilitation

Institute, Center, Proger, Jackson, Classroom (Staff Education), Hemenway, Boston Dispensary, and Biewend.

The Pratt Building was built in 1939. It is 6 stories plus one basement level. The building has 55,000 gross square feet and a licensed capacity of 100 beds.

The Farnsworth Building was built in 1947 and consists of 6 stories plus one basement level with a total area of 100,000 gross square feet. It has a licensed capacity of 135 beds which includes 21 intensive care beds and 10 clinical study unit beds. It also has a 7-room O.R. suite.

The New Floating Hospital was built in 1982 and has 8 stories with 282,500 gross square feet. The facility has a licensed capacity of 100 beds.

The Ziskind Building was built in 1925. It is 7 stories plus one basement level and an area of 101,000 gross square feet. Its primary occupancy is research laboratories and related animal quarters. Other facility uses include hospital administrative and medical department offices, several diagnostic X-ray rooms, anatomic pathology, and the clinical chemistry laboratory.

The Rehabilitation Institute Building was built in 1958. It is 6 stories with no basement. It has 55,000 gross square feet and a licensed capacity of 25 rehabilitation beds. Other principal occupancies include the Emergency Department on the first floor.

The Center Building was built in 1930. It is 5 stories plus one basement level. It has 49,500 gross square feet and a licensed capacity of 10 beds. It contains some pediatric and adult outpatient areas and medical office space.

The Proger Building was built in 1973. It is 9 stories plus one basement level. It has 187,500 gross square feet and a licensed capacity of 44 beds including 10 intensive care beds.

The Jackson Building was built in 1930. It is a 4 stories plus one basement level. It has 24,500 gross square feet and is in the process of being converted to administrative office space. Jackson was occupied until August 1982 with Boston Floating Hospital inpatient units.

The Classroom Building was built before 1900. It is 2 stories with a total area of 2,000 gross square feet and is used for staff education purposes.

The Hemenway Building was built in 1915 and consists of 4 stories plus one basement level. It has 10,500 gross square feet housing administrative offices.

The Boston Dispensary Building was built in 1883. The original building is 4 stories plus one basement level. Two additions are 3 stories plus one basement level. It has 47,500 gross square feet. Facility uses include outpatient clinics, medical staff offices, and a central pharmacy.

The Biewend Building was built in 1924. It is 14 stories plus one basement level and is structurally integral with an adjacent 4,000-seat theater at its lower 3 floors. Total building area is 145,000 gross square feet. Hospital departmental space occupied includes outpatient clinics and related medical staff offices, administrative functions and research. A small part of the building is occupied by commercial tenants or is vacant.

2.2 MEDICAL CENTER COMPLEX POPULATION

Daily person activity associated with Tufts and New England Medical Center totals approximately 9,550 people. Of this total, an estimated 4,200 persons are associated with Tufts and 5,350 with New England Medical Center. The U.S.D.A. Human Nutrition Research Center, when fully occupied by the end of 1982, will generate an additional 300 employees in the university and medical complex area.

The Tufts population is comprised of 1,600 medical, dental and veterinary students, 1,050 full-time faculty and staff, and 1,550 part-time faculty and staff. New England Medical Center has a total employment of 4,000 persons. Outpatient activity averages 850 persons daily and visitors approximately 500 persons per day.

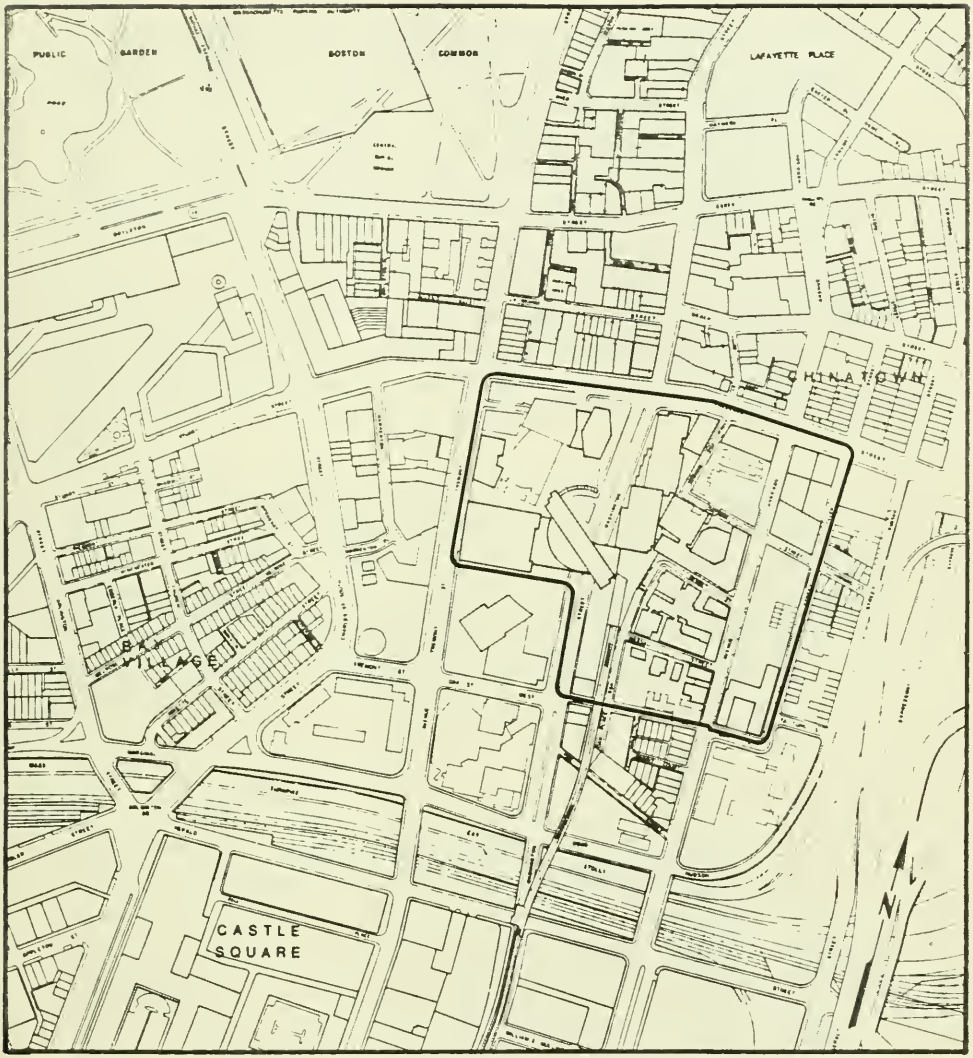
2.3 LAND USE

2.3.1 Tufts and New England Medical Center Setting

The Tufts and New England Medical Center complex is located along the southern edge of the Boston Central Business District. The urban environment in general is a mix of residential, institutional and commercial land uses. The complex itself is bordered by Boston's Chinatown neighborhood, the garment district and the theater district. The relationship of the university and medical complex to adjacent neighborhoods is illustrated in Figure 2.3-1.

The general boundaries of Tufts and New England Medical Center are shown in Figure 2.3-1. The area is roughly defined by Stuart/Kneeland Streets on the north, Tyler Street on the east, Oak Street on the south, and Tremont Streets on the west. The university and medical complex, including the health science schools and the hospital, forms a significant portion of the Chinatown/South Cove Urban Renewal Area as defined by the Boston Redevelopment Authority (BRA) in the 1960's. In support of the urban renewal area program pursued by the BRA, Tufts and NEMC have made changes in their development plans since the 1960s that have represented reductions in the land area occupied or being planned for development.

Since 1966, development of Tufts and NEMC has been guided by the Cooperation Agreement reached with the City of Boston, specifying the needs and concerns of each party. The BRA's urban renewal plan determined the Chinatown/South Cove neighborhoods to be a blighted area, requiring almost total renewal. As a result, significant land use changes have taken place in and around the university and medical complex.



LEGEND

General University and Medical Complex Study Area

0 100 200 400 800 Feet

Figure 2.3-1 Tufts and NEMC - Neighborhood Setting

In tandem with the City's implementation of the South Cove Urban Renewal during the late 1960's and 1970's, the New England Medical Center embarked on a program to replace and consolidate ambulatory care and inpatient facilities. Two stages of this development program have been completed, including the Proger Building (radiotherapy, radiology special procedures, nuclear medicine, ambulatory clinics, adult medicine inpatient units, central medical records) and the recently dedicated New Floating Hospital (pediatric inpatient and ambulatory care, centralized surgery units, core clinical laboratories and consolidated adult and pediatric radiology). In addition, the Tufts Dental Health Sciences School facilities and USDA Human Nutrition Research Center were completed.

To date, even as program scope and requirements have expanded, development has been confined largely to the original land area defined in the 1966 Cooperation Agreement. Although space needs and building configurations have changed in recent years, the specific land use of the Tufts and NEMC complex has remained devoted to institutional uses. Recently, lease options were acquired on buildings at 15 and 35 Kneeland Street.

2.3.2 Surrounding Land Uses

Tufts and NEMC are surrounded by a mix of urban land uses. Immediately adjacent to Tufts and NEMC is the Don Bosco School, Boston's only parochial technical school. Major landmarks in the adjacent theater district include the Metropolitan Center, the Shubert and Wilbur Theaters and the Charles Playhouse. Churches include the Boston Chinese Evangelical Church, St. James and Maryknoll Sisters Center. Parking facilities and small commercial buildings including restaurants, food stores, laundries, and shops related to the garment industries are located in the vicinity.

Community facilities include the Chinese Golden Age Center, the YMCA, and the Chinese Merchants Association. To the east of the area, the strip of land between Tyler and Hudson Street serves as the bridge between the older portion of Chinatown and the newer section represented by Tai Tung Village. Bay Village is located west of Tufts and NEMC, containing buildings and homes dating from the mid to late 1800s.

The area surrounding Tufts and NEMC has undergone substantial changes, particularly the completion of the Massachusetts Turnpike Extension and the implementation of the South Cove Urban Renewal Project, beginning in the mid 1960's. Extensive demolition took place for urban renewal purposes. Portions of the urban renewal area materialized into three housing projects: Mass. Pike Towers and Tai Tung village which house nearly half of the Chinese community, and Bay Village, which has undergone gentrification similar to that in the South End. Other changes included construction of a new Orange Line rapid transit route, an addition to the Don Bosco School, the Quincy Elementary School and Community Center, and upgrading of utilities in the area.

Although BRA urban renewal efforts were largely completed by the late 1970's, other urban development activities have continued. Recently the theater district has enjoyed revitalization marked by the renovation and restoration of the Wilbur Theater and the Metropolitan Center. Both the State Transportation Building and Jordan Marsh-Lafayette Place development presently are under construction. The Park Plaza development, with its hotel, condominium and commercial space, is expected to get underway shortly.

The most significant community neighboring Tufts and NEMC is Chinatown, the fourth largest "Chinatown" in the country. This is an important residential and ethnic community whose inhabitants came to Boston in the last quarter of the nineteenth century and by 1935 lived in the area north of Kneeland Street. While there are no definite boundaries to the Chinese community, the 1980 census figures place the

Asian population within the City of Boston at about 15,000, up from estimates of 8,000-12,000 in 1970.

The Chinese community has a particular interest in future development in the area by Tufts, NEMC and others. While recent development activities by Tufts, NEMC and other groups represent new economic promise for the area in terms of commerce, jobs and tourists, they also represent a perceived challenge to the continuation of Chinatown as it has historically existed. Significant concerns in the Chinese community include preservation of the industries comprising the principal employment base, provision of affordable housing for community residents, and social, recreational and educational opportunities.

The ethnic population in Chinatown and South Cove is primarily low to middle income, closely dependent upon the garment industry and restaurant trades to provide an employment base for a population where the language barrier can be a deterrent to employment. The Chinese population has experienced rapid growth while at the same time, the garment industry has declined in Boston, the restaurant industry has neared the saturation point, and the area's development activities have driven up local property values. This latter impact not only affects rents for low income families, forcing them to find housing elsewhere, but also drives up commercial space rents for industries whose operating margins leave them little leverage against major new operating costs.

As a result of the Chinese community's concern about the loss of jobs, an ad-hoc task force of concerned city and community groups has formulated a proposal to consolidate Boston's garment industries in a single location at the abandoned Boston Army base. An Urban Development Action Grant (UDAG) proposal was filed in July 1982 for implementation of this plan. In late September, tentative approval has been given to the grant application by the federal government.

2.3.3 Tufts and NEMC in the Community

New England Medical Center is the third largest acute general hospital in the Boston area, serving a wide range and variety of communities, including referrals from all of Massachusetts, New England and beyond. In the 1970's, a survey performed for NEMC showed that approximately 85% of the pediatric ambulatory patients, 75% of emergency service patients and 25% of inpatients reside in Boston.

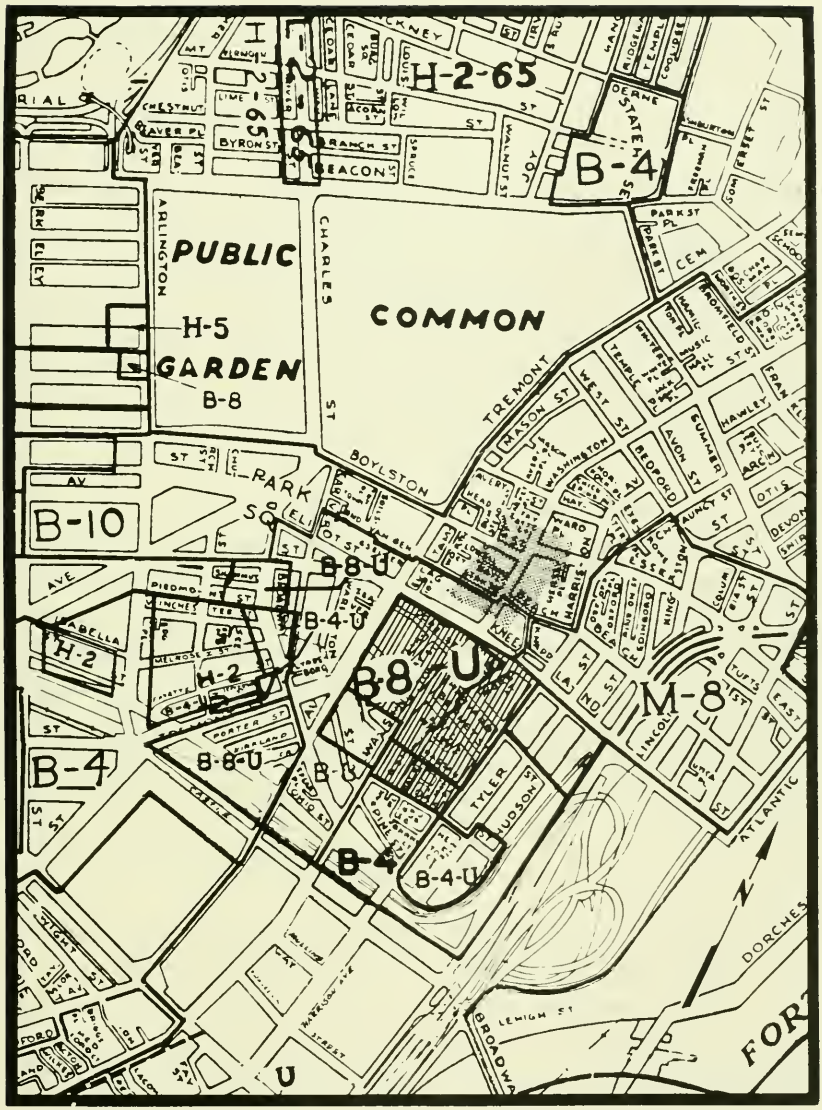
As a resource of medical care for Chinatown residents, the New England Medical Center was little used prior to 1969. This was due, in part, to the barriers which prevented their access to necessary care. The barriers were related to lingual, cultural and financial considerations. Two reports served to delineate the problems [Action for Boston Community Development report on the Chinese in Boston, 1970 and An exploration of Patterns of Medical Care and Cultural Congruence of the Chinese Residents of Boston's Chinatown]. The latter report indicated that those who had been hospitalized in the New England Medical Center experienced a language barrier, considered the food unpalatable, and encountered financial problems during their stay. Clinic hours were regarded as incompatible with the employment schedule of most of the community's residents.

Tufts and NEMC responded to these problems and the growing expression of concern from the community by aggressively working to remove the barriers to health care. The language barrier has been addressed by NEMC's active recruitment of Chinese speaking professionals and employees at all levels. Interpreter service for patients was organized and signs and instructions have been printed in Chinese. Dialogue with the community led, first, to the establishment of an Evening Clinic for the Chinese patients in the hospital and then to the financial and professional support of an independent clinic operated by the Boston Chinese Community Health Service. It was NEMC's belief that a health service designed and operated by the community would be able to address itself more effectively and

efficiently to resident population health problems. The Boston Chinese Community Health Services, Inc. expanded into a broader based neighborhood health center in the Quincy School, the South Cove Community Health Center, with continued support from New England Medical Center. Mental health problems of the community are addressed through the Chinese speaking psychiatric and social worker services of the Tufts Community Mental Health Program.

2.3.4 Existing Zoning Regulations

The Tufts and NEMC complex is zoned B-8, which allows retail businesses, offices, and institutional (hospital) use. Significant portions of the university and medical complex are classified as a B-8-U district. Use of land by medical institutions is now classified as a "conditional use" according to a recent amendment to the Boston Zoning Code. Adjacent surrounding areas are zoned to allow for business, commercial and light manufacturing use. The zoning designations are shown in Figure 2.3-2.



Reference: Boston Zoning Commission
Map 1 (B-1191)

0 400 800 1200 Feet

Figure 2.3-2 Study Area Zoning Designation

2.4 TRANSPORTATION

2.4.1 Introduction

Project development incorporated into the Master Plan can result in significant changes in the demand on existing transportation services. This change in demand could, in turn, have direct implications for the future operating characteristics of the transportation system. Because an accurate determination of the significance of these changes is essential to effective project development and design, the transportation analysis has taken account of both present (baseline) conditions and future conditions.

The transportation baseline analysis examines the current transportation system components providing access to the Tufts and NEMC complex, describes existing operating conditions, and evaluates operating characteristics of the facilities and services provided. The results of the baseline analysis provide a benchmark against which Master Plan project generated impacts can be evaluated. The analysis is also used to determine whether projected transportation impacts are attributable to the Master Plan projects or are the result of normal growth trends and other project activities within the general area.

2.4.2 Transportation Systems Network

The Tufts and New England Medical Center complex is served by a multi-modal transportation system. System elements include automobile, taxi, public and private bus, rail rapid transit, communter rail and pedestrian modes. In evaluating each transportation mode, the concept of "system carrying capacity" was applied. The system carrying capacity approach is predicated on development of a comparison between operational capacity and the resulting demand placed on the system component by the project actions under consideration.

The data base for the transportation analysis was compiled through a combination of field measurements by the ERT study team and public agency contact. Agencies contributing to the analysis efforts include the City of Boston Traffic & Parking Department (BTP&D), the Central Transportation Planning Staff (CTPS), the Boston Redevelopment Authority (BRA), and the Massachusetts Bay Transportation Authority (MBTA).

Street Network Configuration

Located along the southern edge of the Boston Central Business District, the Tufts and New England Medical Center complex is accessible from both the Central Artery, Southeast Expressway and Massachusetts Turnpike Extension. Major access into and egress from the site serving points in the metropolitan region is provided by these limited access facilities.

Access to Tufts and NEMC from the regional highway system is provided by Kneeland Street (Figure 2.4-1). The Kneeland Street - Stuart Street alignment forms the northern edge of the complex and serves as the major east-west arterial facility providing immediate access to the university and medical facilities. Kneeland Street varies in width from 60 feet to 66 feet with traffic signal control on the major intersecting north-south streets. Stuart Street by the site ranges in width from 44 feet on the approach to Tremont Street to 60 feet by Washington Street.

Tremont Street, a major one-way north-south oriented arterial facility serves as the westerly edge of the Tufts and NEMC complex. Tremont Street varies in width from 50 to 52 feet between Stuart Street and Shawmut Avenue. Additional north-south oriented streets providing direct access include Washington Street (two-way), Harrison Avenue (one-way north to south) and Tyler Street (one-way south to north). Secondary east-west access is provided by Oak Street which forms the southern edge of the site activity.

Figure 2.4-1 Street Access Facilities

Existing traffic circulation patterns and traffic control locations are depicted in Figure 2.4-1.

Peak Hour Travel Demand

As part of the environmental assessment, vehicle turning movement and classification counts were taken by ERT at the key gateway intersection areas to the Tufts and NEMC complex. Locations inventoried included Kneeland Street at Harrison Avenue, Kneeland Street at Washington Street, Stuart Street at Tremont Street, and Washington Street at Oak Street. In addition, recent traffic count data was obtained from the City of Boston Traffic and Parking Department and the BRA for the street system providing immediate acess to Tufts and NEMC. The traffic count data base is compiled in Appendix B.

The morning peak commuter period on the adjacent street system extends from approximately 7:45 A.M. to 8:45 A.M. As shown in Figure 2.4-2, the Kneeland Street westbound approach to Harrison Avenue has an A.M. peak hour demand of 635 vehicles, of which 14.3% are trucks. The Kneeland Street eastbound approach had an observed demand of 625 vehicles with trucks comprising 10.4% of the total hourly demand. Harrison Avenue, the primary north-south oriented street facilty passing through the complex, had an observed A.M. peak hour demand of 355 vehicles. Trucks comprised approximately 3.0% of the vehicle demand on Harrison Avenue.

During the A.M. peak hour, intersection areas accommodating major vehicle turning maneuvers between north-south and east-west street facilities include Stuart Street at Tremont Street, Washington Street at Kneeland and Stuart Streets, and Harrison Avenue at Kneeland Street. In addition to the observed vehicular demands, the key gateway intersections also experience major pedestrian movement across street approaches between activity north of the Kneeland Street - Stuart Street corridor alignment and Tufts and NEMC.

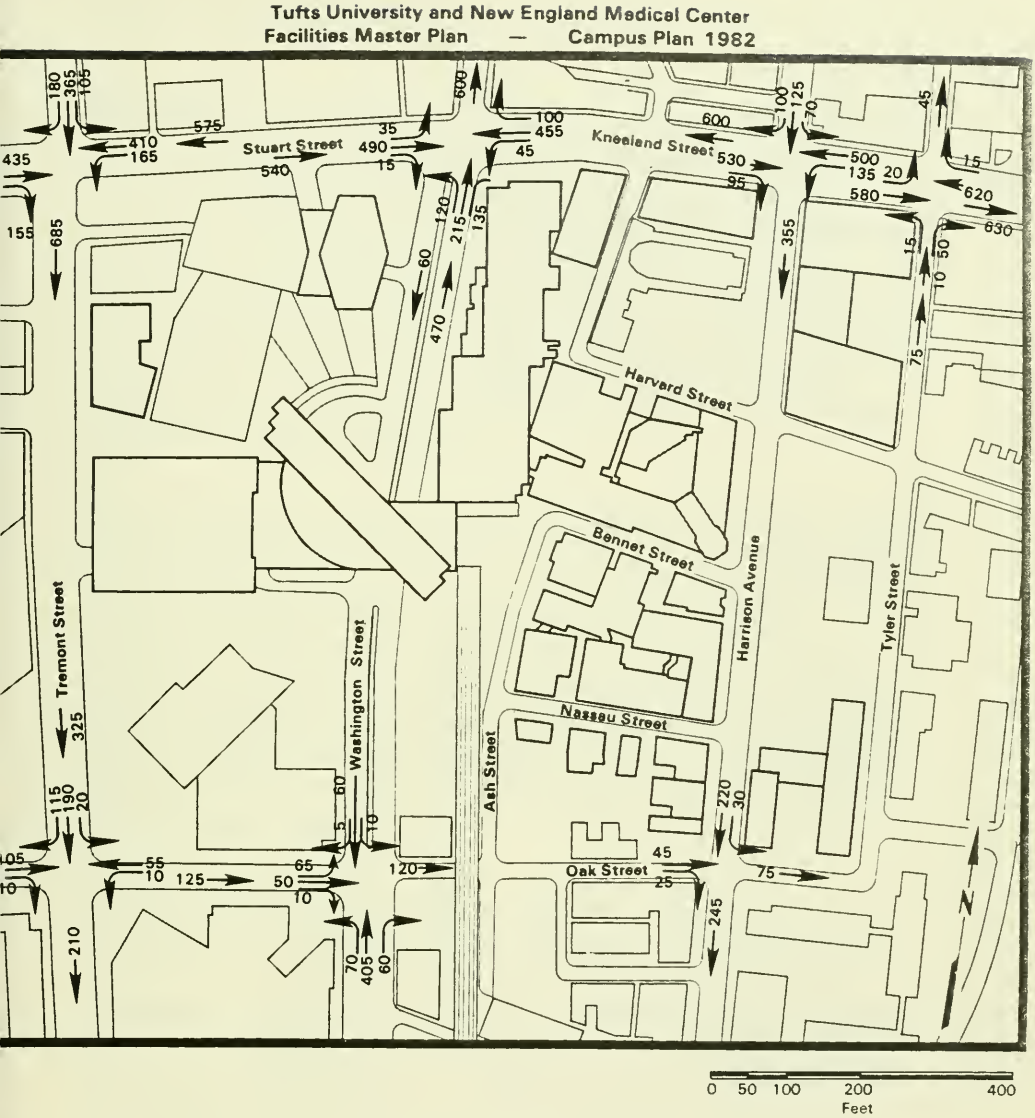


Figure 2.4-2 1982 A.M. Peak Hour Traffic Demand

The evening commuter peak hour generally occurs between 4:30 P.M. and 5:30 P.M. As shown in Figure 2.4-3, the peak direction of traffic flow on the Stuart Street - Kneeland Street alignment is eastbound towards the entrances to the Massachusetts Turnpike, the Southeast Expressway and the Central Artery. Eastbound traffic demand ranges from 660 vehicles on the Stuart Street approach to Tremont Street to 905 vehicles just east of Tyler Street. Westbound traffic flow ranges between 605 and 665 vehicles. Traffic demand on Harrison Avenue during the 4:30 to 5:30 period totaled 400 vehicles just south of the intersection with Kneeland Street.

From an operational perspective, traffic flow on the street facilities providing access to and circulation within the Tufts and NEMC complex are affected by the auto and truck demand volumes, pedestrian flow, and the restrictions created by on-street parking and truck unloading. Using existing traffic demand, street geometrics and traffic signal phasing, capacity analyses were performed for the key gateway intersection areas for both the A.M. and P.M. commuter peak hours. Locations analyzed include Harrison Avenue at Kneeland Street, Washington Street at Kneeland Street and Stuart Street, and Tremont Street at Stuart Street.

Capacity analysis for intersections measures the operating characteristics of traffic movement based on prevailing conditions. Measures of the quality of traffic flow are expressed by letter designations called Levels of Service. Levels of Service range from Level "A" with stable free flow to Level "E" capacity at unstable flow, or the maximum amount of traffic which can be accommodated at the intersection. Conditions worse than capactiy are designated Level "F". At this level, traffic flow is forced with congestion and frequent delays resulting. Table 2.4-1 summarizes the volume-level of service relationship for intersection areas.

The results of the capacity analyses indicated that the gateway intersection locations are currently operating at a Level of Service "C/D" during the A.M. peak hour. In this operating condition,

Figure 2.4-3 1982 P.M. Peak Hour Traffic Demand

TABLE 2.4-1

INTERSECTION CAPACITY

Level of Service	Traffic Operating Characteristics
"A"	• free flow • low volumes • high speed
"B"	• stable flow • moderate volumes • speed affected by traffic conditions
"C"	• unstable flow • high volumes • speed restricted by volumes
"D"	• approaching • unstable flow • high volumes • low but tolerable speed
"E"	• unstable flow • high volumes • low speed
"F"	• forced flow • extreme congestion • speed approaches zero

Source: Highway Capacity Manual, 1965.

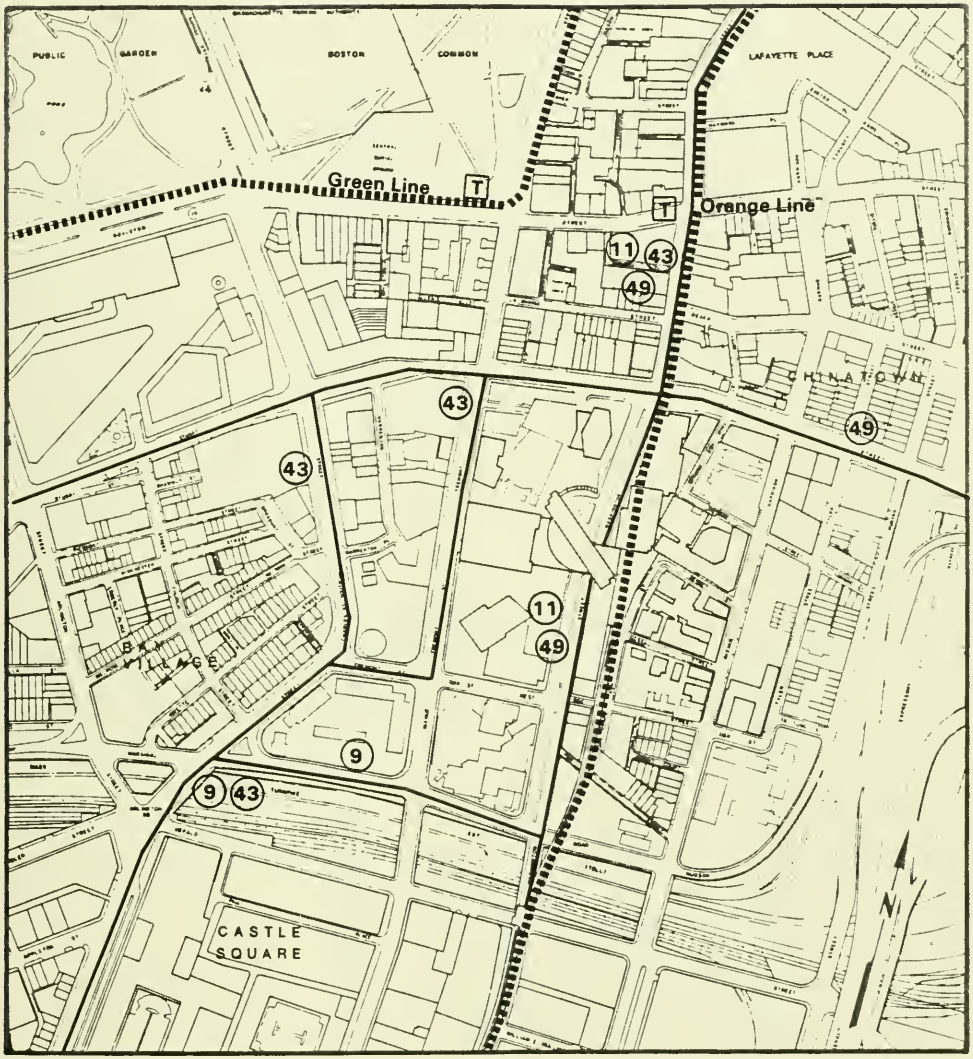
vehicular speeds are reduced with periods of vehicle queuing and unstable traffic flow. The disruption to traffic flow is primarily attributable to the combined interference created by left-turning vehicles, pedestrian crossings, and illegally parked vehicles on intersection approaches. During the P.M. peak hour, a Level of Service "D" operating condition prevails due to the higher overall intersection approach traffic volumes.

Public Transportation

The sub-area of Boston within which the Tufts and NEMC complex is located is well served by MBTA subway and bus service (Figure 2.4-4). Based on the results of measurements taken during the ERT field surveys, it was observed that three of the four MBTA subway lines can be accessed within a 5-minute walk. The Orange Line can be accessed via the Essex Station. Access to the Green Line is provided at the Boylston Station, with the Washington Station serving the Red Line. Persons utilizing the Blue Line can transfer from the Orange Line at the State Street Station. The key operating characteristics of the subway line stations serving the Tufts and NEMC complex are summarized in Table 2.4-2.

Bus transit to the Tufts and NEMC complex is provided by four local MBTA bus line routes (Figure 2.4-4). Bus Route 49 extends from the Northampton subway station to Essex Street, providing access to the Tufts and NEMC complex from the south. Bus Route 9 connects City Point with the Copley MBTA station, serving persons from the east. Bus Route 11 connects the Bay View area with Washington Street. Bus Route 310 is a suburban bus route connecting communities southwest of Boston with South Station.

During the commuter peak hours, a total of 8 trips are made on Route 9, 8 trips on Route 11, and 10 trips on Route 310 in the peak direction of travel. Route 49 does not operate during the commuter peak hours.



LEGEND
- Subway Line
- Subway Station
- MBTA Bus Route Number
- Bus Route Alignment

0 100 200 400 800 Feet

Figure 2.4-4 Public Transportation Services, Tufts and NEMC

TABLE 2.4-2

MBTA SUBWAY LINE STATION CHARACTERISTICS

MBTA Station Facility	Total Daily Persons* Admitted to Station	Approximate Service Frequency (Minutes)				
		Rush Hours	Day	Night	Sat.	Sun.
Essex Station - Orange Line	5,680	4	8	12	8	15
Boylston Station - Green Line	5,010	7	7	10	7	8
Washington Station - Red Line	35,140	6	10	13	10	16
State Street Station - Blue Line	12,365	4	7	11	7	11

*MBTA Passenger Traffic Count Data

Pedestrian Flow

Pedestrian movement across Kneeland Street - Stuart Street between land use activity in the downtown area and Tufts and NEMC was observed to be quite high throughout the day. The heaviest pedestrian flows were observed at the intersections of Washington Street with Kneeland Street and Stuart Street, and Tremont Street with Stuart Street.

Pedestrian crosswalks are provided at the intersection areas on Kneeland Street and Stuart Street under traffic signal control. Pedestrian signals are also present at Washington Street and Tremont Street to assist persons in crossing the street approaches to those high volume intersection areas. Based on the observations made during the field surveys, sidewalks adjacent to Tufts and NEMC are of sufficient width to accommodate existing pedestrian traffic.

Parking

The Tufts and NEMC complex currently has a parking supply of 1,738 spaces. Table 2.4-3 summarizes the parking facilities currently containing the 1,738 spaces. On an average day, the spaces are currently used as followed:

- by a daily average of approximately 650 patients/visitors in 460 spaces
- by a daily average of approximately 1,400 employees in 1,128 spaces
- by non-Medical Center parkers in 92 spaces (at the Herald garage).

TABLE 2.4-3

UNIVERSITY AND MEDICAL CENTER PARKING SUMMARY

Facility	Parking Spaces	Present (1982) Use		
		Employees	Patient/ Visitors	Students
Tremont Garage	966	716	250	-
Posner Lot	195	15	180	-
Oak Street Lot	95	95	-	-
Herald Garage	400	250	-	150
Washington Street Lot	42	42	-	-
Harvard Lot	40	10	30*	-
Total All Facilities	1738	1128	460	150

*Medical professional related visitors to Tufts.
Source: NEMC Parking Inventory, October 1982.

2.5 AIR QUALITY

2.5.1 Introduction

Relevant air quality issues associated with the proposed 10-year Master Plan project actions include: (1) an evaluation of present and future stationary source (i.e., boilers, incinerators, etc.) emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and total suspended particulates (TSP), and (2) an evaluation of changes in ambient CO concentrations in the project area caused by increases in traffic and redistribution of traffic resulting from the project actions.

2.5.2 Objectives of Analysis

The principal objective of the air quality analysis is to evaluate the air quality impacts associated with the proposed 10-year Master Plan for the Tufts University and New England Medical Center Complex and to compare these impacts to appropriate State of Massachusetts and federal air quality standards for compliance. The following potential sources of air pollutants have been evaluated with respect to existing and proposed future configurations of the Master Plan projects.

- stationary sources
  - (i) diesel generators,
  - (ii) pathological incinerators,
  - (iii) cooling towers
- indirect sources
  - (i) local and regional traffic, and
- fugitive emissions
  - (i) fugitive dust emissions released during the construction phase.

Principal tasks performed to meet this objective are:

- Estimate current and future CO impacts from vehicular emissions. This includes both regional calculations and site-specific CO evaluations within the study area for the baseline case and the projection of these levels to 1985 and 1992. Future case predictions presented in Chapter 3 include an evaluation of expected changes in ambient CO concentrations due to the proposed implementation of the 10-year Master Plan. The main consideration is expected changes in traffic patterns and the associated CO emissions on nearby streets, access roads, intersections, and pedestrian ways as a result of proposed project actions. Worst-case 1-hour and 8-hour CO concentrations generated by normal peak traffic and predicted peak traffic within the study area are determined through diffusion modeling.
- Estimate the regional effects on CO, hydrocarbons (HC), and NO_x concentrations due to predicted changes in traffic patterns resulting from implementation of the 10-year Master Plan.
- Estimate the impacts of the stationary source emissions on ambient SO_2, CO, TSP, and NO_x concentrations.
- Evaluate construction related fugitive dust emission impacts.

2.5.3 Methodology

National Ambient Air Quality Standards (NAAQS) have been established for six major pollutants, designated as "criteria pollutants." These are TSP, SO_2, CO, nitrogen dioxide (NO_2), photochemical oxidants (expressed as ozone, O_3), and lead (Pb). The State of Massachusetts has adopted criteria pollutant standards identical to the NAAQS. Vehicular emissions are a significant source of CO, NO_x, and HC (precursor to ozone) while the stationary sources at Tufts University and New England Medical Center primarily emit SO_2, TSP, CO, and NO_x. Motor vehicles also contribute to ambient concentration of TSP due to tire wear and exhaust emissions. Vehicular emissions of sulfur

oxides are considered insignificant compared with the emissions of the other five pollutants. Fugitive emissions contribute to total ambient TSP concentrations.

Table 2.5-1 shows the federal and state air quality standards related to these criteria pollutants. The standards specify exposure periods for each pollutant. Studies of health effects have indicated that short-term exposures to high concentrations of CO have definite adverse effects on the human body; hence the CO standards for 1-hour and 8-hour periods were established. Conversely, long-term exposures to NO_2 have been associated with adverse health effects, while short-term acute exposures have not. Thus, the NO_2 standard was promulgated as a long-term annual arithmetic mean. Both short- and long-term exposure to suspended particulate matter have been shown by health effects studies to adversely affect the respiratory system. Hence, both 24-hour and yearly standards have been established for TSP.

In addition, since proposed changes involved in the 10-year Master Plan could result in increased pollutant emissions, Prevention of Significant Deterioration (PSD) rules and standards apply. However, since net emissions increases due to the proposed modifications at the complex are expected to be very small, a PSD permit will most likely not be required.

In Phase I of this analysis, existing air quality has been defined. This was accomplished through a thorough examination of currently available air quality monitoring data collected in the project area and obtained from the Massachusetts Department of Environmental Quality Engineering (DEQE). Expected and predicted impacts associated with Tufts and NEMC stationary sources and local indirect sources were also evaluated.

In Phases II and III, the documentation for which is contained in Chapter 3, regional and local impacts have been determined for comparison to the 1982 existing case and future baseline cases. In these cases, partial and full implementation of the 10-year Master

TABLE 2.5-1

MASSACHUSETTS STATE AND NATIONAL

AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Period	Primary Standard (μg/m3)	Secondary Standard (μg/m^3)
SO_2	Annual (Arithmetic)	80	-
	24-Hour	365*	-
	3-Hour	-	1,300*
TSP	Annual (Geometric)	75	60**
	24-Hour	260*	150
CO	8-Hour	10,000*	-
	1-Hour	40,000*	-
NO_2	Annual (Arithmetic)	100	-
O_x	1-Hour	235+	-
Pb	Maximum calendar quarter mean	1.5	-

*Not to be exceeded more than once per year.

**Guide to achievement of other standards.

+Not to be exceeded more than an average of 1 day per year over 3 years.

Plan have been assumed. In addition, an analysis on fugitive dust impacts associated with the construction phase has been included.

Impacts due to the stationary source emissions have been dealt with qualitatively as expected emissions are very small. Fugitive dust emission impacts associated with construction have also been assessed qualitatively due to their expected short-term duration.

However, more detailed analyses of the indirect source impacts have been performed since these are likely to be most constraining. Both local and regional impacts associated with vehicular emissions have been determined.

The term local, as used in this report, denotes the territory in the immediate vicinity of the project or a selected critical intersection. For the local analysis, the total CO air quality in the vicinity of the Tufts and NEMC facilities includes both background pollutant concentrations and contributions from local traffic and the facilities being studied. Current and future background CO concentrations to be used in this analysis were obtained from the Mass. DEQE. The addition of modeled local traffic and project-related pollutant concentrations to background concentrations yields the total CO air quality which is evaluated at specified critical receptors.

Regional impacts are those impacts affecting a wider area surrounding the proposed project. Potential adverse impacts of CO, NO_x, TSP, and SO_2 are discussed on the local level while impacts of the proposed project on a regional scale are also evaluated.

Local indirect source air quality impacts were predicted using:

- the Environmental Protection Agency (EPA) computer program MOBILE-2 to obtain current (1982) and future (1985 and 1992) CO, HC, and NO_x emission factors for the project area,
- the EPA Indirect Source Guidelines "Worksheet 2" methodology for determining intersection queue lengths and emissions, and

the EPA computerized line source dispersion model HIWAY-2 to predict CO concentrations adjacent to streets and intersections.

The various traffic, meteorological, and geometric assumptions employed in the local CO assessments are presented in each of the following sections.

2.5.4 1982 Baseline Environmental Conditions

Baseline air quality conditions for 1982 in the Tufts and NEMC project area are presented in this section. Included here is a description of existing air quality conditions based on an analysis of available historical monitoring data. A description of existing stationary sources is also presented. Finally, rationale for selecting particular intersections (indirect sources) for further analysis and their predicted impacts are discussed.

Existing Air Quality

This section discusses the current air quality in the vicinity of Tufts and NEMC complex. Annual ambient air quality monitoring data summaries were obtained from the Massachusetts Department of Environmental Quality Engineering (DEQE) for the six most recent years of record (1976 through 1981). These data are presented with respect to the Massachusetts State and National Ambient Air Quality Standards (NAAQS) for SO_2, TSP, NO_x and CO shown in Table 2.5-1. Listed below are those monitors which have been selected as best representing the existing ambient air quality in the area of Tufts and NEMC for a given pollutant.

Pollutant	Monitor I.D.	Location
SO_2	0240-001	Boston, JFK Building
	0240-002	Boston, Kenmore Square
	0240-012	Boston, 115 South Hampton St.

	0240-015	Boston, Kneeland St.
	0240-016	East Boston, Visconti St.
	0240-021	East Boston, 340 Breman St.
	0240-023	Boston, Morrissey Blvd.
TSP	0240-001	
	0240-002	
	0240-012	
	0240-013	Boston, 68 Central Square
	0240-024	Boston, 200 Columbus Ave.
	0240-025	Boston, 59 Fenway
NO_2	0240-001	
	0240-002	
	0240-012	
	0240-016	
	0240-021	
CO	0240-002	
	0240-016	
	0240-021	
	0240-022	Boston, 600 Washington St.

Sulfur Dioxide (SO_2)

Table 2.5-2 presents a six-year SO_2 monitoring data summary for the Boston area. As indicated in this table, the maximum observed annual concentration of 55 $\mu g/m^3$ was recorded in 1980 at the Kenmore Square monitor and was approximately 69% of the Massachusetts Ambient Air Quality Standard of 80 $\mu g/m^3$. The highest observed 3-hour (469 $\mu g/m^3$) and 24-hour (197 $\mu g/m^3$) average SO_2 concentrations are respectively 36% and 54% of the applicable air quality standards and were recorded at the Kenmore Square monitor during 1978 and 1980. As a result, compliance with the ambient SO_2 standards has been demonstrated over the last 6 years. Although the summary data do not indicate any apparent trend, it is assumed that, with the continued application of state and federal air quality regulations, this area is to remain an attainment area for SO_2.

TABLE 2.5-2

DEQE SO_2 MONITOR DATA SUMMARY FOR THE VICINITY OF TUFTS AND NEMC

(CONCENTRATIONS IN $\mu g/m^3$)

Year	Monitor ID	No. of Observations	Annual Mean	24-Hour Average Max.	24-Hour Average 2nd Max.	3-Hour Average Max.	3-Hour Average 2nd Max.	
1976	0240-002	7651	50	189	162	348	293	
	0240-001	41	21	76	68			+
	0240-002	55	26	81	71			+
	0240-012	19	*	66	63			+
1977	0240-002	6950	52	160	155	278	262	
	0240-002	35	37**	118	86			+
	0240-012	33	24**	68	60			+
	0240-016	15	*	81	73			+
1978	0240-002	7789	50	165	155	469	424	
	0240-002	14	*	76	58			+
	0240-012	12	*	73	71			+
	0240-016	13	*	92	63			+
1979	0240-002	7924	50	170		312		
	0240-016	7451	26	128		231		
1980	0240-002	7400	55	197	191	367	320	
	0240-016	3516	21*	60	55	131	106	
	0240-021	3119	34*	131	123	225	191	
1981	0240-002	7883	50	180	170	343	317	
	0240-015	8139	42	189	173	296	257	
	0240-021	7998	37	126	102	215	204	
	0240-023	6389	29	178	160	288	273	

+Non-continuous SO_2 Bubbler Sampling.

*No. of samples is insufficient to calculate an accurate annual mean.

**Calculated without summer quarter data.

Total Suspended Particulates (TSP)

A six year TSP monitor data summary is presented in Table 2.5-3. Analysis of these data indicate several violations in the Boston area of both the secondary and primary ambient air quality standards. Specifically, the secondary annual average TSP standard of 60 $\mu g/m^3$ has been exceeded at one or more monitors during each year of the six year record. The primary annual average TSP standard of 75 $\mu g/m^3$ was violated in 1976, 1977 and 1978 at the Kenmore Square monitor. Recorded observations of 24-hour average TSP levels during the years 1976 through 1979 indicate several exceedances of the 260 $\mu g/m^3$ primary standard and the 150 $\mu g/m^3$ secondary standard. No exceedances of the 24-hour average TSP standard have been observed after 1979.

It is important to note that the summary data presented in Table 2.5-3 indicate a trend of lower observed TSP concentration in this area since 1977. The years 1980 and 1981 demonstrate compliance with all but the secondary annual average TSP standard of 60 $\mu g/m^3$. It should also be noted that TSP concentrations tend to be more localized than for other pollutants and therefore these data do not necessarily imply non-attainment in the immediate area of Tufts and NEMC.

Nitrogen Dioxide (NO_2)

Table 2.5-4 is a summary of annual average of NO_2 measurements in the Boston area for the years 1976 through 1981. The maximum valid annual average concentration over this six-year period is 93 $\mu g/m^3$ recorded in 1980 at the Kenmore Square monitor. This value is 93% of the Massachusetts Ambient Air Quality Standard for NO_2 of 100 $\mu g/m^3$. The data presented in Table 2.5-4 do not indicate a significant trend over the past years but do demonstrate compliance with the MAAQS and NAAQS over the entire period. It is expected therefore with current air quality regulations that this area will continue to be attainment for this pollutant in the future.

TABLE 2.5-3

DEQE TSP MONITOR DATA SUMMARY FOR THE VICINITY OF TUFTS AND NEMC

(CONCENTRATIONS IN $\mu g/m^3$)

Year	Monitor ID	No. of Observations	Annual+ Mean	24-Hour Average Max.	24-Hour Average 2nd Max.
1976	0240-001	46	57	149	117
	0240-002	57	94	264	256
	0240-012	24	*	112	103
1977	0240-002	43	79	305	270
	0240-012	54	56	121	102
1978	0240-002	52	82	247	176
	0240-012	45	67	129	119
1979	0240-012	58	67	192	117
1980	0240-012	50	74	149	133
	0240-025	15	**	96	64
1981	0240-012	73	55	111	98
	0240-013	49	53	102	95
	0240-024	56	62	123	97

+Annual average TSP concentration is a geometric mean

*Distribution of observations prevents accurate calculation of annual mean

**Number of samples is insufficient to calculate an accurate annual mean.

TABLE 2.5-4

DEQE NO_2 MONITOR DATA SUMMARY FOR THE VICINITY OF TUFTS AND NEMC
(CONCENTRATIONS IN $\mu g/m^3$)

Year	Monitor ID	No. of Observations	Annual Mean	
1976	0240-001	42	56	+
	0240-002	55	81	+
	0240-012	20	*	+
1977	0240-002	47	79	+
	0240-016	15	*	+
	0240-002	1702	77	
	0240-016	5710	56	
1978	0240-002	13	75	+
	0240-016	14	66	+
	0240-002	6482	86	
	0240-016	5902	86	
1979	0240-002	4293	79	
	0240-016	5979	90	
1980	0240-002	5186	93	
	0240-016	2333	101*	
	0240-021	694	61*	
1981	0240-002	6543	71	
	0240-021	7323	55	

*Number of samples or distribution thereof is insufficient to calculate an accurate annual mean.
+Non-continuous NO_2 bubbler sampling.

Carbon Monoxide (CO)

A summary of maximum observed CO concentrations in the Tufts and NEMC area for the 1976 through 1981 years of record is presented in Table 2.5-5. As shown in this table, the maximum recorded one-hour average CO concentration is 29,900 $\mu g/m^3$ approximately 75% of the Massachusetts ambient air quality standard of 40,000 $\mu g/m^3$. Maximum 8-hour average concentrations indicate at least one violation per year since 1976. It should be noted, however, that a definite trend of lower concentration is present in more recent years. This is to be expected as emission controls are generally increased from year to year on motor vehicles which are the primary contributors to these concentrations.

As with TSP, CO concentrations in an area such as Boston are highly localized and dependent more on traffic flow patterns than any other single factor. Moreover, given the locations of the monitors presented in Table 2.5-5, the data presented do not necessarily reflect the ambient level of CO at the Tufts and NEMC complex.

Stationary Sources

Current operations at the Tufts and NEMC complex include emissions of SO_2, TSP, NO_x and CO from the stationary sources presented below.

- Two diesel-fired emergency backup generators
  - (i) a 900 kw maximum capacity installed in 1973, and
  - (ii) a 565 kw capacity generator installed in 1980.
- Two pathological incinerators
  - (i) a 150 lb/hr capacity incinerator operated by the NEMC
  - (ii) a 200 lb/hr capacity incinerator operated by Tufts University.

Both diesel-fired generators are operated by the NEMC. Their purpose is to supply electrical power in the event of a power shortage or

TABLE 2.5-5

DEQE CO MONITOR DATA SUMMARY FOR THE VICINITY OF TUFTS AND NEMC

(Concentrations in mg/m^3)

Year	Monitor ID	No. of Observations	8-Hour Average Max.	8-Hour Average 2nd Max.	1-Hour Average Max.	1-Hour Average 2nd Max.
1976	0240-002	8,119	19,090	18,515	26,450	24,150
	0240-016	6,680	17,595	17,135	28,750	23,000
1977	0240-002	7,919	16,560	14,490	28,750	24,150
	0240-016	6,294	13,110	12,765	29,900	24,150
1978	0240-002	8,366	13,800	12,650	23,000	21,850
	0240-016	6,566	17,250	16,100	26,450	26,450
1979	0240-002	8,098	17,250	16,560	23,000	19,550
	0240-016	6,517	17,825	17,595	28,750	28,750
1980	0240-002	5,594	11,800	11,200	16,100	13,800
	0240-016	2,878	11,900	11,900	18,400	16,100
	0240-021	1,834	5,400	5,000	9,200	8,100
	0240-002	2,200	13,900	11,400	28,800	21,900
1981	0240-002	6,571	14,000	10,000	22,000	16,000
	0240-021	7,344	10,000	8,000	12,000	12,000

outage. Standard operation of these units is 100 hours/year maximum or approximately 2 hours/week. Table 2.5-6 lists pollutant emission rates representative of these operating conditions. Emissions of SO_2, TSP, NO_x and CO were calculated with emission factors from AP-42 using data supplied by Tufts and NEMC. Units 1 and 2 burn a No. 2 diesel fuel with a maximum sulfur content of 0.3%. Pollutant emissions from the emergency generators are vented through separate stacks approximately 168 feet above ground level. Figure 2.5-1 shows the locations of these stacks within the Tufts and NEMC Complex.

The pathological incinerators at Tufts and NEMC are both fired by natural gas and burn a combination of human pathologicals and animal specimens. Unit 1 is a Lambert Sawyer type 4 operated by NEMC approximately 16 hours/day. Maximum loading of this unit is 150 lbs/hr. Unit 2 is a two-stage Jarvis incinerator with after burner and is operated by Tufts University approximately 14 hours/day. This incinerator has a maximum loading capacity of 200 lbs/hr and was completely rebuilt in 1978. Table 2.5-7 presents uncontrolled pollutant emission rates for each unit at maximum operating conditions. Emissions of SO_2, TSP, CO and NO_x were determined from data supplied by Tufts and NEMC using the most recent emission factors from AP-42. Exhaust gases from Unit 1 are vented through a 35 foot stack located at the northeast corner of the Ziskind building. Emissions from Unit 2 are released approximately 135 feet above ground level through a stack located in the northwest corner of the Stearns building. Exact stack locations for the Tufts and NEMC pathological incinerators are presented in Figure 2.5-1.

In addition to these stationary sources, the operations at the Tufts and NEMC complex will include emissions of SO_2, TSP, NO_x, and CO from the following stationary sources which will be fully operational by the end of 1982:

- Nutrition Research Center - USDA
  - i three gas-fired boilers totalling 500 hp (10th floor)

TABLE 2.5-6

EMISSION RATES FOR TUFTS AND NEMC EMERGENCY DIESEL GENERATORS

	Unit #1		Unit #2	
Capacity (kw)	565		900	
Emission Release Height (ft)	168		168	
Fuel Consumption (gal/hr)	45		65	
Fuel Type	Diesel, NO. 2 (0.3% sulfur)		Diesel, NO. 2 (0.3% sulfur)	
Emission rates	lbs./hr.	TPY	lbs./hr.	TPY
SO_2	2.00	0.10	2.85	0.15
TSP	0.58	0.03	0.85	0.04
NO_2	16.60	0.86	24.00	1.25
CO	10.10	0.53	14.60	0.75

TABLE 2.5-7

POLLUTANT EMISSIONS FROM THE TUFTS AND NEMC PATHOLOGICAL INCINERATORS

	Unit #1		Unit #2	
Capacity Loading (lb/hr)	150		200	
Emission Release Height (feet)	35.0		135.0	
Emission rates	lbs./hr.	TPY	lbs./hr.	TPY
SO_2	Negligible		Negligible	
TSP	0.60	1.75	0.80	2.04
NO_2	0.23	0.67	0.30	0.77
CO	Negligible		Negligible	

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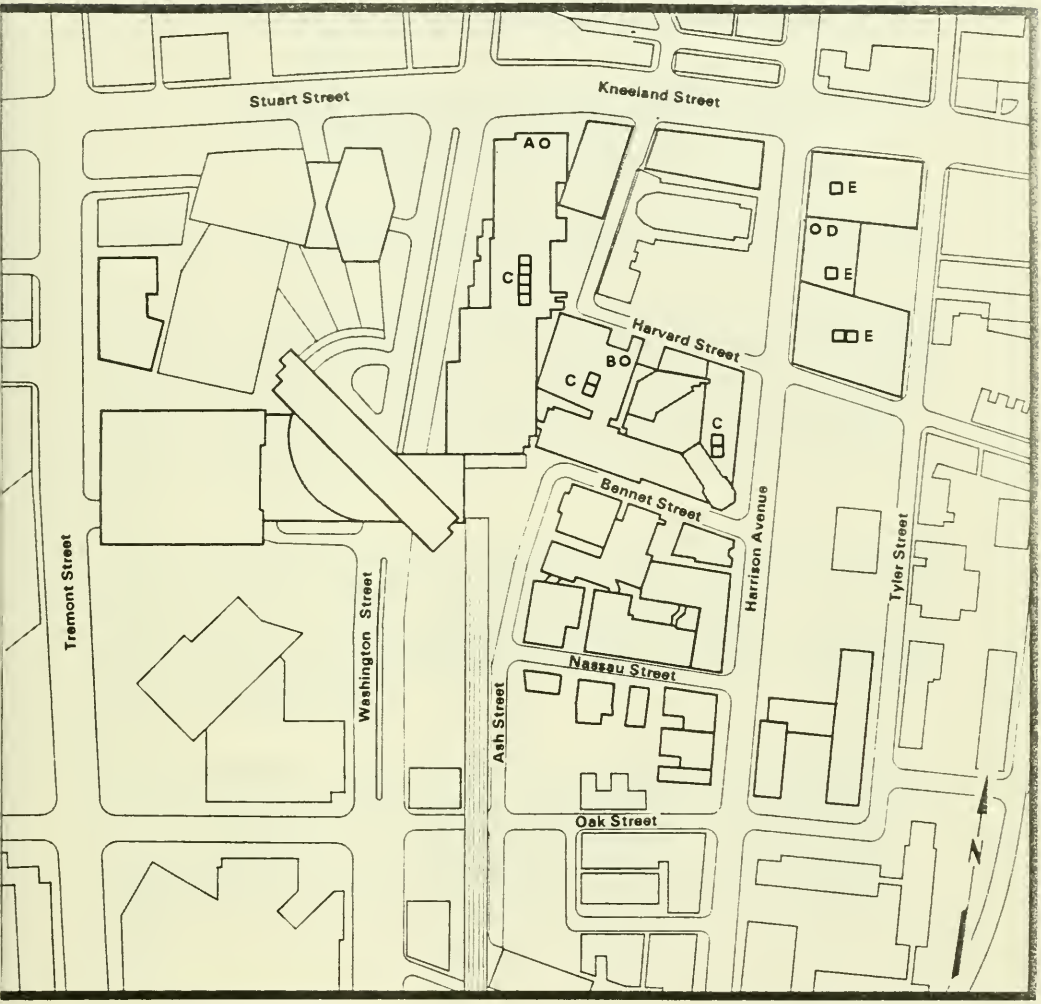

KEY

A. NEMC Emergency Diesel Generator Stacks
B. NEMC Pathological Incinerator Stack
C. NEMC Cooling Towers
D. Tufts Pathological Incinerator Stack
E. Tufts Cooling Towers

O – Denotes Stack Location
□ – Cooling Tower Location

0 50 100 200 400
Feet

Figure 2.5-1 Location of Tufts and NEMC Stationary Sources

ii one emergency diesel generator rated at 625 kw (10th floor)

iii additional cooling towers - 850 tons (14th floor) and

- New Floating Hospital (1B) - NEMC

i one emergency diesel generator rated at 565 kw.

Therefore, these sources have been included in the 1982 baseline case.

It has been assumed in determining pollutant emission rates that each emergency diesel generator unit will operate a maximum of 100 hrs/year or approximately two hours/week. Table 2.5-8 lists pollutant emission rates representative of these operating conditions. A No. 2 diesel fuel with a maximum sulfur content of 0.3% was assumed in deriving these emission rates.

The three gas-fired boilers at the Human Nutrition Research Center are expected to total 500 hp. This represents approximately 16.7 mmBtu/hr. Assuming they would operate every hour of the year at full capacity estimated emissions are presented in Table 2.5-9, based on AP-42 calculations.

The Environmental Protection Agency has adopted a set of de minimis emission levels by which pollutant emissions from a given source may be termed significant (Federal Register, Vol. 45, 7 August, 1980). De minimis emission values for SO_2, TSP, CO and NO_x are presented below in comparison to total emissions from Tufts and NEMC stationary sources.

Pollutant	TNEMC Emissions (tpy)	De minimis Emission Rate (typ)
SO_2	0.49	40
TSP	4.66	25
NO_x	17.91	40
CO	3.52	100

TABLE 2.5-8

EMISSION RATES FOR ADDITIONAL TUFTS AND NEMC EMERGENCY DIESEL GENERATOR TO BE FULLY OPERATIONAL BY END OF 1982

	Human Nutrition Research Center (USDA)		New Floating Hospital	
Capacity (kw)	625		565	
Fuel Consumption (gal/hr)*	47		43	
Fuel Type*	Diesel, No. 2 (0.3%S)		Diesel, No. 2 (0.3% S)	
Emission Rates	lbs/hr	TPY	lbs/hr	TPY
SO_2	2.09	0.10	1.91	0.10
TSP	0.61	0.03	0.55	0.03
NO_x	17.34	0.87	15.86	0.79
CO	10.5	0.53	9.65	0.48

*Assumed fuel consumption and fuel type.

TABLE 2.5-9

GAS-FIRED BOILER EMISSIONS*

Pollutant	lbs/hr	TPY
SO_2	0.01	0.04
TSP	0.17	0.74
NO_2	2.90	12.70
CO	0.28	1.23

*Natural gas is the assumed fuel

As indicated above, stationary source emissions resulting from 1982 baseline Tufts and NEMC operations are less than 45% of de minimis levels for all pollutants. As a result, these stationary source emissions should be associated with very minimal insignificant impacts for each pollutant.

In addition to the sources discussed above there are currently 14 cooling towers in operation on various buildings at the Tufts and NEMC complex. The towers serve to cool water associated with air conditioning and refrigeration units. They are of the mechanical draft type and maximum circulating water flow rate for any tower does not exceed 1730 gpm. Figure 2.5-1 shows the locations of cooling towers, on building roofs at the Tufts and NEMC complex. In addition to these cooling towers, more cooling towers totalling 850 tons will be in operation at the Nutrition Research Center by the end of 1982. The cooling towers do not emit any particulate matter and given the size and number of towers at Tufts and NEMC it is expected that drift and/or fogging if any is negligible. Thus it is assumed that there exists no air quality pollutant impacts attributable to these sources.

Indirect Sources

The EPA guidelines for reviewing indirect sources (EPA 1978) provide for a detailed local analysis based on the evaluation of carbon monoxide concentrations. Since traffic in the vicinity of Tufts and NEMC is expected to be modified as a result of the implementation of the 10 year Master Plan, such an indirect source analysis is necessary. Predictions are made only for peak hour (either the AM or PM commuter peak hour) and maximum 8-hour CO concentrations at selected receptor points in the study area under the most realistically unfavorable meteorological (CO maximizing) conditions likely to occur.

In addition, nitrogen oxides and hydrocarbons are potentially hazardous to human health through their ability to enter into atmospheric reactions in the presence of sunlight and produce

photochemical oxidants (measured as ozone). This process requires considerable time as well as downwind transport distances of several miles. Therefore, these pollutants have been addressed on a regional, rather than a local basis.

Two intersections have been selected for detailed indirect source CO analyses based on three main considerations:

1) location with respect to Tufts and NEMC,
2) greatest potential for traffic pattern modifications as a result of the 10-year Master Plan actions, and
3) locations which the general public normally frequents for period(s) approaching the time period(s) associated with the CO standards (1- or 8-hours).

The total CO level at selected receptor points in any impact area is due to vehicular traffic emissions on the nearest street or "traffic link" plus a background value represented by contributions due to all other sources in the region. The two selected critical intersections are:

1) Kneeland St. at Stuart and Washington Sts., and
2) Kneeland St. at Harrison Avenue.

Predicted carbon monoxide concentrations at selected receptors in the vicinity of each of these intersections were generated using MOBILE-2, "Worksheet 2", and the EPA computerized line source dispersion model HIWAY-2.

MOBILE-2 is an EPA computer program that calculates emission factors for HC, CO, and NO_x from highway motor vehicles. The program uses the calculation procedures and emission factors presented in Compilation of Air Pollutant Emission Factors: Highway Mobile Sources, March 1981 (EPA 460/3-81-005). MOBILE-2 calculates emission factors for eight individual vehicle types. Emission estimates are based on various ambient, vehicle usage, and local conditions such as temperature, speed, mileage accumulation and accrual distributions.

In this analysis, emission rates were calculated based on the following assumptions for each analysis year:

- a worst-case realistic ambient temperature of 20°F,
- a vehicle type mix for both the 1-hr peak period and the maximum 8-hr period,
- national average operating conditions including 20.6% cold start, 27.3% hot start and 52.1% hot stabilized,
- mid-block average speeds, and
- 1977 vehicle age distributions and mileage accumulation rates for light duty vehicles for Suffolk County as obtained from R.L. Polk and Company and national averages for all other vehicle types.

As provided in Guidelines for Air Quality Maintenance Planning and Analysis Volume 9 (Revised): Evaluating Indirect Sources, September, 1978 (EPA-450/4-78-001), the methodology "Worksheet 2" was used in computing excess emissions due to special conditions such as queueing at intersections. Traffic volume base count data were obtained from an ERT field study supplemented by data supplied by City of Boston Traffic and Parking Department. Estimated traffic-growth projections were obtained from the Central Transportation Planning Staff. In general, total emissions are determined in a three-step procedure using "Worksheet 2":

1) the line source emission rate that corresponds to a vehicle traveling at an average speed is computed,
2) excess line source emission rates due to interruptions in traffic flow and the distance over which the excess emissions apply are then calculated,
3) emission adjustment factors are then applied to obtain the emission rate required for the dispersion analysis.

Finally, the EPA Highway air pollution model, HIWAY-2 (EPA-600/8-80/018), was used to calculate localized CO concentrations. HIWAY-2 is a steady state Gaussian model applied to determine air pollution concentrations at receptor locations downwind of highways located in relatively uncomplicated terrain. HIWAY-2 modeling assumptions included the following:

- at-grade, level roadways,
- influence of buildings or other obstructions on local air currents is neglected,
- receptor height of 1.5 m,
- 1.0 meter/second wind speed,
- maximizing wind direction for each intersection/receptor,
- Pasquill-Gifford class E stability (stable) for 1-hour averages and Class D stability (neutral) for 8-hour averages,
- initial mixing length of 1.5 m
- 8-hour persistence factor of 0.7,
- emission factors as calculated by MOBILE-2 and "Worksheet 2."

Based on a conversation with Mass. DEQE personnel (Heidi O'Brien, 9/8/82) required background CO concentrations are remaining fairly constant in the Boston area. It was recommended that for this analysis acceptable background CO concentrations of 4 ppm (4.6 mg/m^3) and 2 ppm (2.3 mg/m^3) could be used for the 1- and 8-hour averaging periods, respectively. It has been assumed in this analysis that these background concentrations are representative of each analysis year.

Maximum 8-hour local CO concentrations and total CO concentrations (local plus background) were predicted at four receptors at each intersection. Several wind directions were simulated in the modeling analysis to determine the maximizing case. Based on these 8-hour calculations, a maximizing receptor/meteorological condition for each intersection was determined. Maximum 1-hour CO concentrations were predicted at this receptor using identical maximizing wind direction.

Kneeland/Stuart & Washington Streets

The 1982 baseline traffic conditions at this intersection indicate that approximately 38% of the traffic approaches the intersection on Stuart St., 35% on Kneeland, and 27% on Washington Street. Receptors were selected at the corner of Stuart and Washington, and at the corner of Kneeland St. and Washington St. Additional receptors were placed approximately 40 meters west on Stuart Street and 40 meters east on Kneeland St. These latter two receptors were sited to pick up queueing contributions. All receptors were placed on the sidewalks next to adjacent structures.

The modeling results for the 1982 baseline case presented in Table 2.5-10 reveal that maximum predicted impacts occur at the receptor located 40 meters east on Kneeland Street. The predicted total CO concentration here was 12.7 mg/m^3 which is in excess of the applicable 8-hour CO standard of 10 mg/m^3. Predicted concentrations at the remaining receptors were also either above or approaching the 8-hour standard.

The maximum predicted 1-hour CO concentration at the Kneeland St. receptor was 24.4 mg/m^3. Adding to this the 1-hour background concentration of 4.6 mg/m^3 results in a maximum total 1-hour CO concentration of 29.0 mg/m^3. This is well below the federal and state 1-hour CO standard of 40 mg/m^3.

Kneeland St. and Harrison Avenue

The 1982 baseline traffic conditions at the intersection of Kneeland and Harrison Avenue indicate that approximately 24% of the traffic approaches the intersection on Harrison Avenue, 33% on Kneeland St. (westbound) and 43% on Kneeland St. (eastbound). Receptors were selected at opposite corners at the intersection on Kneeland St. on the approach sides. Additional receptors were placed approximately 40 meters east and west on Kneeland St. Again, all receptors were placed on the sidewalks next to the adjacent structures.

TABLE 2.5-10

1982 BASELINE 8-HOUR PREDICTED CO CONCENTRATIONS (mg/m^3)

AT THE INTERSECTION OF KNEELAND/STUART & WASHINGTON

Receptor*	Predicted Concentration	Background	Total
A	6.9	2.3	9.2
B	9.7	2.3	12.0
C	7.0	2.3	9.3
D	10.4	2.3	12.7

*Receptor Key
A = Corner of Stuart and Washington
B = 40 meters west on Stuart
C = Corner of Kneeland and Washington
D = 40 meters east on Kneeland

As indicated in Table 2.5-11, the maximum predicted 8-hour CO concentration for the 1982 baseline case was 11.7 mg/m^3 which is in excess of the 8-hour CO standard of 10 mg/m^3. Predicted concentrations at the remaining receptors were also approaching the standard.

The maximum predicted 1-hour CO concentration at the maximum receptor indicated in Table 2.5-11 was 19.9 mg/m^3. Adding the 1-hour background CO concentration of 4.6 mg/m^3 to this results in a maximum total 1-hour CO concentration of 24.5 mg/m^3. This is well below the federal and state 1-hour CO standard of 40 mg/m^3.

Conclusions

A detailed analysis of 1982 baseline environmental conditions in the vicinity of Tufts and NEMC has been completed. Based on this analysis, the following conclusions can be drawn:

- Measured SO_2 and NO_2 concentrations are well below applicable ambient standards and this area is expected to remain an attainment area for these pollutants.
- Monitoring data in the project area indicate a trend toward lower observed TSP concentrations since 1977.
- Observed CO concentrations in the general project area have indicated violations of the 8-hour standard; however, a trend towards lower CO concentrations is present in recent years. In addition, these monitored values are representative of very localized situations.
- Based on a qualitative analysis of stationary source emissions resulting from existing Tufts and NEMC operations, it is expected that pollutant impacts associated with these sources will be very minimal. Total pollutant emissions expected from all of these stationary sources are well below de minimis emission rates for SO_2, TSP, NO_x and CO.
- As a result of dispersion modeling analysis, indirect source emissions in the vicinity of the Tufts and NEMC project

TABLE 2.5-11

1982 BASELINE 8-HOUR PREDICTED CO CONCENTRATIONS (mg/m^3)

AT THE INTERSECTION OF KNEELAND AND HARRISON STREETS

Receptor*	Predicted Concentration	Background	Total
A	7.1	2.3	9.4
B	9.4	2.3	11.7
C	7.6	2.3	9.9
D	7.0	2.3	9.3

*Receptor Key
A = Corner of Kneeland and Harrison, eastbound side
B = 40 meters west on Kneeland
C = Corner of Kneeland and Harrison, westbound side
D = 40 meters east on Kneeland

sites are predicted to contribute to local CO concentrations in excess of the federal and state 8-hour CO standard. Predicted 1-hour CO concentrations associated with these indirect sources were predicted to be well under the 1-hour standard.

2.6 NOISE

2.6.1 Introduction

This section presents an analysis of the baseline environmental noise conditions for the vicinity of the Tufts University and New England Medical Center complex. Included in this analysis are descriptons of existing noise levels and their significance.

The basic objective of the analysis is to determine if the projects included in the Master Plan will result in exceedance of governmental noise criteria established by the City of Boston and Commonwealth of Massachusetts.

2.6.2 Methodology

Noise impact assessment generally involves three basic steps. The first step is to determine baseline noise levels at points in the community where people could potentially be adversely affected; such points are generally the closest residences, churches, schools, and parks (referred to as noise-sensitive receptors). Baseline noise levels are presented in Section 2.6.3.

The second step is to predict noise levels at these noise-sensitive receptors caused by the proposed project during construction and operation. The third and final step is to evaluate the significance of the change in noise levels from the proposed project.

Noise impact is judged according to two criteria: (1) the extent that specific, quantitative government laws or regulations are exceeded, and (2) the estimated extent to which people will be actually adversely affected by increases in noise levels above existing conditions.

There are no federal regulations that apply directly to the community noise resulting from Master Plan project actions for either the construction or operation phases. However, there are specific requirements limiting noise-generating characteristics of certain types of newly purchased construction equipment.

The Commonwealth of Massachusetts has noise regulations that require appropriate steps be taken to prevent or suppress the generation of "... industrial and commercial sources of sound, and other man-made sounds that cause noise."* Specific guidelines issued by the State Department of Environmental Quality Engineering for the approval of a facility are that the following conditions be avoided:

1. increasing the broadband noise level in excess of 10 dB(A) above background; or
2. producing a pure tone condition.

The broadband background noise level referred to is interpreted as the residual or L_{90} level. A pure tone condition is considered to exist when the sound level of an octave band exceeds the average sound level of adjacent octave bands by 3 dB or more. The Commonwealth of Massachusetts does not specifically regulate allowable construction noise levels.

City of Boston's noise regulations apply to both construction and operational phases of the project. Regulation 3 covering construction noise is summarized in Table 2.6-1. This regulation limits construction noise levels at the lot lines of affected properties as a function of land use characteristics. For stationary, steady sources of noise characteristic of the operational phase of a project, Regulation 2 applies. This latter regulation is presented for maximum

*Massachusetts General Laws, Chapter III, Section 142 authorizes the Department of Public Health to adopt and amend ambient air quality/noise standards and to adopt a plan for the implementation, maintenance, and attainment of such standards.

TABLE 2.6-1

CITY OF BOSTON

SUMMARY OF RESTRICTION ON

CONSTRUCTION SITE NOISE*

3.1 Maximum Levels

Land Use Of Affected Property	Maximum Noise Level Value Measure at Lot Line of Affected Property (dBA)	
	L_{10}	Maximum Noise Level
Residential or Institutional	75	86
Business or Recreational	80	--
Industrial	85	--

(To be evaluated at distances greater than 50 feet from any active contruction device, using slow response of sound level meter.)

3.2 Measurements

- A-weighted
- At 10-second intervals, 100 sample total
- Measured L_{10} during construction must exceed background L_{10} by five dBA to be considered a violation of 3.1.

3.4 Maximum levels under 3.1 do not apply to impact devices (pile drivers, paving breakers, riveters, etc.)

*City of Boston Air Pollution Control Commission, "Regulations for the Control of Noise in the City of Boston," Regulation 3, effective January 1, 1976.

noise levels (on an octave band basis) that must not be exceeded on abutting property lines. The stipulated noise levels are a function of the zoned land use and time of day (approximately corresponding to a distinction between the normal hours of commerce, 7 A.M. to 6 P.M. daily except Sunday, and other times). This regulation is summarized in Table 2.6-2.

The extent of noise impact on human receptors for the proposed project is proportional to a number of interrelated factors: the change in noise level; the presence of existing, nonproject noise sources; people's attitudes concerning the project (Stevens, Rosenblith, and Bolt 1955); the number of people exposed; and the type of human activity affected (sleep, recreation, conversation).

2.6.3 1982 Baseline Environmental Conditions

Description of Baseline Conditions

The noise environment of an urban community such as the Tufts and NEMC area has a base of steady "background" noise, which is the result of innumerable noise sources spread throughout the city. Superimposed on the background noise is the noise of individual local sources which can vary from occasional aircraft, sirens and horns, to the virtually continuous noise from traffic on a nearby major highway. The noise environment is described in terms of noise-sensitive receptors, noise sources, and noise levels. On August 11 and 12, 1982, ERT conducted a spot noise survey in the Tufts and NEMC area for the purpose of obtaining a baseline noise description, which is presented in the following paragraphs.

Noise-Sensitive Receptors

Noise-sensitive receptors are defined as those areas or land uses where people could be adversely affected by noise from a proposed project. Noise-sensitive receptors in the Tufts and NEMC area represent a mix consisting of healthcare (hospital nursing care,

TABLE 2.6-2

CITY OF BOSTON

TABLE OF ZONING DISTRICT NOISE STANDARDS

MAXIMUM ALLOWABLE SOUND PRESSURE LEVELS

Octave Band Center Frequency of Measurement (Hz)	Residential		Residential-Industrial		Industry	Business
	Daytime	All Other Times	Daytime	All Other Times	Anytime	Anytime
31.5	76	68	79	72	83	79
63	75	67	78	71	82	78
125	69	61	73	65	77	73
250	62	52	68	57	73	68
500	56	46	62	51	67	62
1000	50	40	56	45	61	56
2000	45	33	51	39	57	51
4000	40	28	47	34	53	47
8000	38	26	44	32	50	44
Approximate Single-Number-System [dB(A)]**	60	50	65	55	70	65

Notes: 1) Noise standards are extracted from Regulation 2.5, City of Boston Air Pollution Control Commission, "Regulations for the Control of Noise in the City of Boston" effective January 1, 1976.

2) Reference pressure of 2×10^{-5} N/m^2.

*Daytime includes the period between 7:00 A.M. and 6:00 P.M. daily except Sunday.
**For preliminary survey and monitoring only.

research laboratories, administration), education (University, public school), religion, residential and recreation (mini-parks). In addition to these fixed receptors, there is a considerable volume of pedestrian traffic in the Tufts and NEMC area.

Noise Sources

The Tufts and NEMC complex is located in the vicinity of a number of transportation links: (1) the Massachusetts Turnpike (with car and truck traffic) is parallel to and separated from, the southern boundary of the complex by approximately 500 feet, (2) the Southeast Expressway is at a similar distance and is parallel to the east boundary, and (3) Kneeland Street - Stuart Street and Tremont Streets (both heavily traveled city streets) make up significant portions of the north and west boundaries, respectively, of the project. The Orange Line Rapid Transit line runs on an elevated structure through a portion of the site.

In addition to the aforementioned transportation links, there are sources of noise distributed over the site which are related to the functioning of a large medical and university complex. These sources consist primarily of components associated with the heating, ventilation and air conditioning (HVAC) systems of buildings, trash removal operations, and truck delivery activities.

HVAC sources noted in the area consist primarily of window mounted air conditioning units (on older structures) and exhaust blowers. Trash removal operations involving "packer" type trucks represent significant sources of noise of variable occurance and relatively limited duration. Heavy duty diesel trucks use not only the major street links noted previously, but also side streets (Harrison Avenue and Washington Street) that pass through the complex. Emergency vehicles warning devices represent another source of noise intrusion.

Noise Levels

Spot noise measurements were conducted by ERT, at the locations indicated in Figure 2.6-1, on August 11 and 12, 1982. Both "A" weighted and octave band noise level measurements were made (during daytime and nighttime hours) and are presented in Tables 2.6-3 and 2.6-4, respectively. Table 2.6-5 summarizes "A" weighted data and includes identified sources of noise. Noise measurement locations were selected on the basis of the following considerations: (1) encompassing a reasonable coverage of the project site, (2) avoiding proximity to construction activity, and (3) being in vicinity of noise sensitive receptors.

Each ("A" weighted) noise measurement sample at monitoring locations lasted approximately 15 to 20 minutes.* This time period represented a reasonable balance between concerns for both data quality and spatial coverage of the project area. On several occasions, instrument readouts after 10 and 20 minutes of sampling were compared to establish the adequacy of the shorter sampling duration.

The measured noise levels are considered to be consistent with the observed noise producing activities in the vicinity of the development area. The noise environment in the Tufts and NEMC area is considered representative of a urban, downtown commercial use area. Relatively steady noise sources consist of traffic, and building air conditioners and fans. Passage of diesel trucks and operation of "packer type" trash trucks result in local noise intrusions above background noise levels.

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*Instrument description and general measurement proceedures are presented in Appendix C.

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KEY
- ● Noise Measurement Location
- Noise Sensitive Receptors:
- Residential Units
- Church
- School

0 50 100 200 400
Feet

Figure 2.6-1 Noise Measurement Reference Locations

TABLE 2.6-3

MEASURED A-WEIGHTED NOISE LEVEL STATISTICS

Measurement Location	Date	Hour	Level Statistics* (dBA)						
			L_{99}	L_{90}	L_{50}	L_{10}	L_{1}	L_{max}	L_{eq}
1	8/11	1430	58	60	62	65	83	98	74
2	8/11	1500	61	63	67	69	72	75	68
3	8/11	1542	55	56	58	62	67	69	60
1	8/12	0347	50	52	54	59	62	69	57
2	8/12	0254	59	59	60	62	70	76	62
3	8/12	0326	48	49	52	57	72	78	59

*Based upon a noise sampling interval of 15 to 20 minutes and a sampling rate of 7 samples per second.
Source = ERT Field Survey Measurements, August 1982.

TABLE 2.6-4

MEASURED OCTAVE-BAND LEVELS

Meas. (Hz) Loc.	Date	Time Hour	Octave-Band Center Frequency 31.5	63	125	250	500	1K	2K	4K	8K	16K
1	8/11	1430	70	70	70	60	57	54	50	46	40	25
2	8/11	1500	65	68	66	65	65	63	60	51	40	20
3	8/11	1542	68	64	61	57	53	52	50	42	36	18
1	8/12	0347	65	63	60	53	49	47	40	34	22	14
2	8/12	0254	70	68	68	62	58	56	49	42	32	16
3	8/12	0326	60	60	55	53	50	48	41	33	22	13

Source = ERT Field Survey Measurements, August 1982.

TABLE 2.6-5

BASELINE MEASURED NOISE LEVELS (dBA)

Location	Time* (hour)	Observed Noise Sources**	Noise Levels L_{90}	L_{50}	L_{10}	L_{eq}
1. Tai Tung Village	Day (1430)	V	60	62	65	74
	Night (0347)	V	52	54	59	57
2. Harrison Ave.	Day (1500)	V, WAC, T	63	67	69	68
	Night (0254)	F, WAC	59	60	62	62
3. Don Bosco School	Day (1542)	V	56	58	62	60
	Night (0326)	V	49	52	57	59

*Measurements conducted over the period 8/11/82, 1430 hours to 8/12/82, 0420 hours.

**Key: V = vehicles (cars & trucks), WAC = window mounted air conditioners, T = packer type trash trucks, F = fans.

Source = ERT Field Survey Measurements, August 1982.

2.7 ENERGY

2.7.1 Objectives of Analysis

The basic objective of the baseline analysis is to present existing energy consumption information associated with the Tufts-NEMC complex operation.

2.7.2 Methodology

Existing (baseline) energy requirements have been prepared by the engineering departments of Tufts and NEMC from 1980-1981 meter readings. The only governmental criteria directly bearing upon energy consumption for the Master Plan development are the requrements contained in the Commonwealth of Massachusetts building code, which incorporates the provisions of "the Code for Energy Conservation in New Building Construction."

2.7.3 1982 Baseline Energy Conditions

The primary sources of energy for the Tufts and NEMC complex are steam and electricity. Steam and electricity are both purchased directly from the Boston Edison Company. Steam is used primarily for space heating, sterilization and hot water generation. The condensate from the steam is discharged directly to the sewer. Electricity is used for lighting, medical equipment and for operation of heating, air conditioning and related air handling equipment (HVAC). A small amount of natural gas is also used for laboratory bunsen burners and to fire the two pathological incinerators. Table 2.7-1 presents the steam and electrical requirements based upon recent (1980-81) experience.

TABLE 2.7-1

ENERGY CONSUMPTION: BASELINE CONDITIONS

Building Unit	Floor Area (Gross Square Feet)	Steam (10^3 Pounds)	Electricity (10^3 kwh)
NEMC	1,060,000	118,898	22,623
Tufts	552,000	59,611	14,692
USDA (Human Nutrition Research Center)	206,500	38,859*	7,004
Totals	1,818,500	217,368	44,319

*The Human Nutrition Research Center, to be completed in 1982, will use natural gas instead of steam; for the purposes of comparison in this table, the energy equivalent amount of steam was employed.

2.8 INFRASTRUCTURE

2.8.1 Introduction

The infrastructure components of the Tufts and NEMC Master Plan environmental assessment include water use, wastewater discharge and waste management. Baseline conditions for each of the components have been defined to allow comparison with changes predicted with project developments included in the Master Plan. The objectives of the analysis are to identify and evaluate environmental impacts associated with the various stages of development during the 10 year duration of the Master Plan.

Two general criteria were used to evaluate infrastructure-related impacts:

1) Ability of projected infrastructure requirements to be met by in-place or future systems (e.g., MDC and City of Boston ability to supply increases in water);
2) Ability to satisfy federal, state and local regulatory requirements applicable to sewerage discharge and waste management.

2.8.2 Baseline Conditions

<u>Water Use</u>

The Tufts and NEMC complex uses water for a variety of purposes, including potable supplies, sanitary wastewater, medical-related needs and chilled water for air conditioning. Water supplies for the City of Boston and most of eastern Massachusetts is under the direction of the state Metropolitan District Commission (MDC). The City of Boston supply originates at Quabbin Reservoir in western Massachusetts, from which water flows via aqueducts and pipelines to the Wachusett Reservoir, Sudbury Reservoir and finally the Chestnut Hill Reservoir. From this reservoir, water is distributed throughout the City of Boston under the direction of the City Water and Sewer Commission (WSC).

The Quabbin Reservoir has a capacity of about 400 billion gallons. Currently, consumers are taking a daily average of nearly 320 million gallons, or about 115 billion gallons per year, approximately one-quarter of the system capacity. The safe yield of Quabbin Reservoir (amount of withdrawal equal to the amount of recharge) is approximately 300 million gallons per day (gpd). Even though the amount of usage exceeds the safe yeield, there is not any concern on the part of MDC due to the large reservoir storage capacity. (MDC 1982a).

The 1981 average daily water consumption for the City of Boston was 132,248,000 gpd or about 235 gpd per person based on the 1980 census. According to the MDC, there are no current supply problems and none are anticipated for the near future. The MDC is in the process of conducting a comprehensive water supply study to the year 2020. (MDC 1982a).

Figure 2.8-1 shows the city water distribution system in the Tufts and NEMC area. Both high service (85-90 psi) and low service (50 psi) water lines are present in the area. The 30 inch main line shown in Figure 2.8-1 provides low service water to the area. High service supplies for the area originate at Park Square. Recently, supplies were boosted by work completed at the Park Square and South Station distribution systems. The WSC has no programmed changes to the distribution system in the area and existing supplies are deemed to be more than adequate to satisfy demand. (WSC 1982a).

Generally, each building in the Tufts and NEMC complex has a separate hook-up to the City water system for regular supplies and fire protection. The existing annual Tufts and NEMC water consumption is estimated to be about 2.9 million cubic feet (about 22 million gallons per year). This represents less than 0.02% of the total average annual MDC usage and about 0.05% of the average annual City of Boston usage.

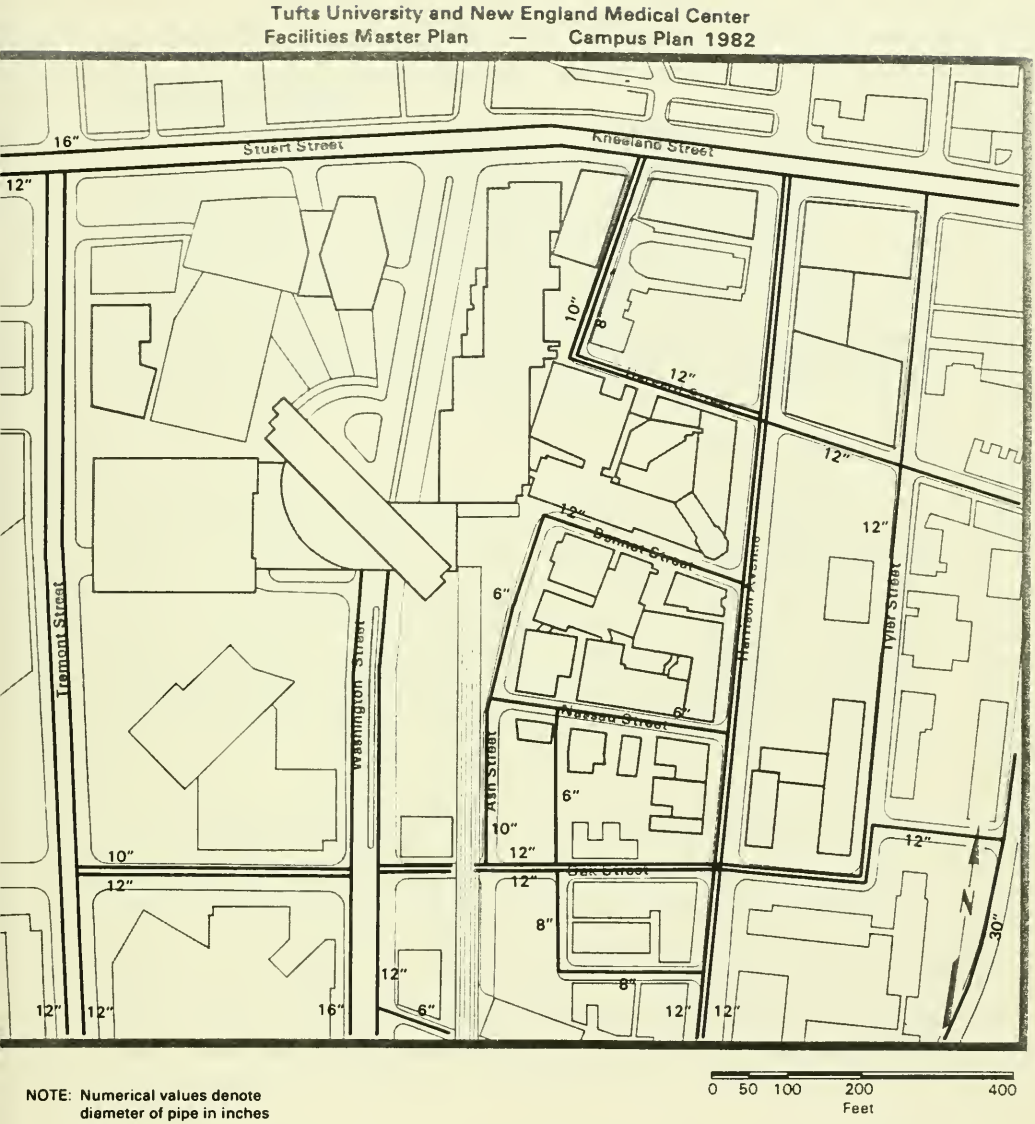


Figure 2.8-1 Water Distribution System to Tufts and NEMC

Wastewater Discharge

As with the distribution of water, Tufts and NEMC wastewater discharges come under the jurisdiction of both the MDC and WSC. Sewage transport is managed by WSC until it enters the MDC distribution system prior to transport to treatment facilities. Figure 2.8-2 shows the main City sewer trunk lines in the area. Sewage flows to the Union Park Street pumping station, under Albany Street to the Boston Main Interceptor, through the Columbus Street Headworks (MDC) to the Deer Island Treatment Plant.

The Deer Island Treatment Plant is located in Boston Harbor and handles wastewater from 22 communities and portions of Boston, Brookline, Newton and Milton. The treatment processes employed at the plant include screening and grit removal, aeration of influent, primary sedimentation and post-chlorination of plant effluent prior to ocean discharge. Treatment of raw sludge is accomplished by sludge thickening prior to digestion. Digested solids and overflow are discharged into the ocean at a controlled rate during outgoing tides.

The treatment plant average daily design flow is 343 mgd. For the fiscal year ending June 30, 1981, the average daily flow was 281 mgd for a total annual flow of about 100,000 million gallons. Over the next 20 years, the MDC does not plan to admit any new towns to the system. An increase in flow of 7% to 12% is anticipated mainly due to population increases in member communities. The treatment plant has the capacity to increase the average daily flow by 62 mgd, or by about 20%. There are no long-term plans at this time to upgrade sections of the MDC system of which Tufts and NEMC is a part. (MDC 1982b).

Each building in the Tufts and NEMC complex has a hookup to the City sewer system. Since sewage charges are based on the amount of water use, an exact quantity of Tufts and NEMC wastewater is not available. However, it is reasonable to assume that the amount of wastewater discharged to the sewer system is approximately equal to the water use, or approximately 22 million gallons per year. This represents

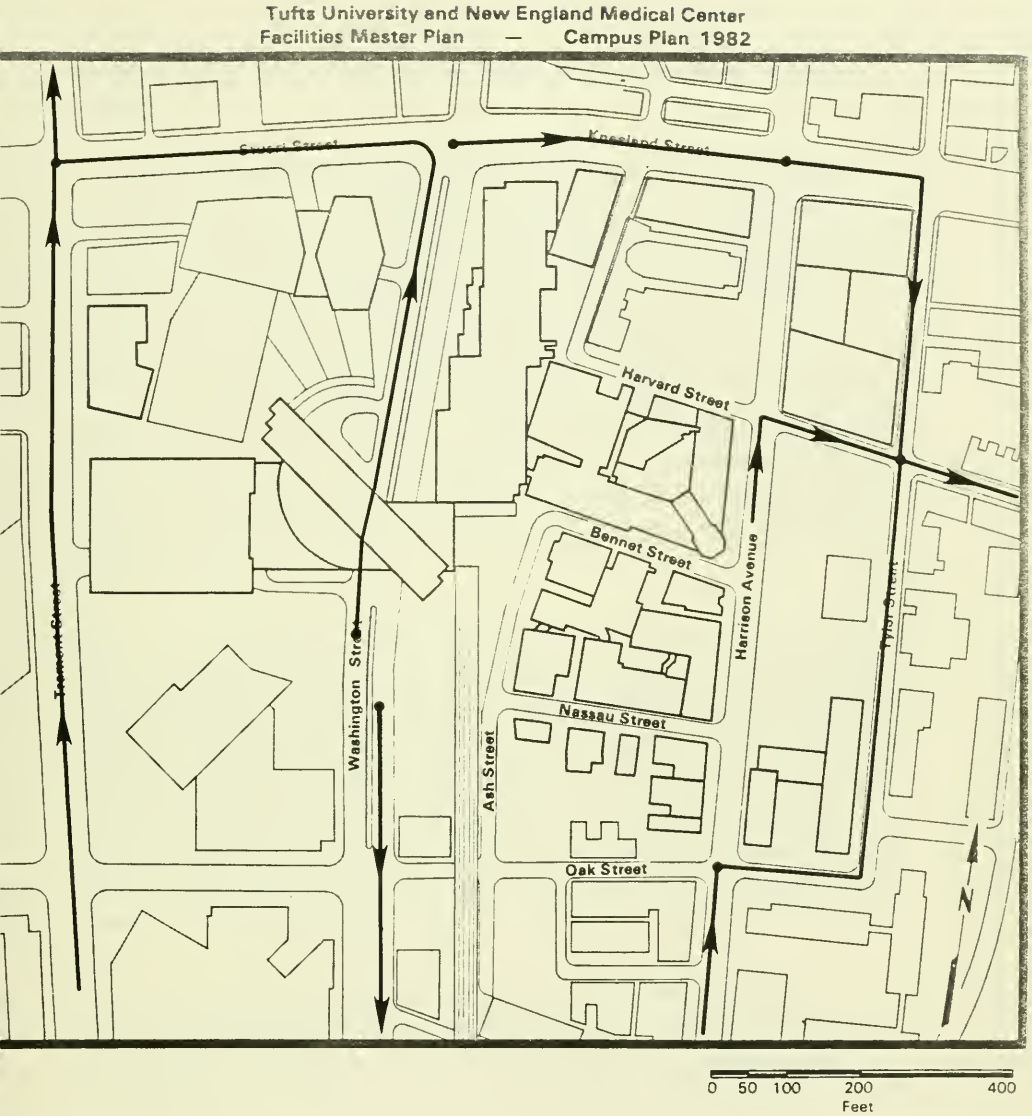


Figure 2.8-2 Main Sewerage Lines to Tufts and NEMC

about 0.02% of the average daily flow to the Deer Island Treatment Plant

A major cause of pollution in Boston Harbor and its tributaries is overflow from combined sanitary and storm sewers. To alleviate the problem, Boston plans to continue the construction of dual systems as financial resources become available (WSC 1982b). In addition, the MDC plans to continue construction of storage facilities for pretreatment of overflows prior to harbor discharge. In the Tufts and NEMC area, sewer overflows eventually drain into Fort Point Channel which feeds into Boston Harbor. Several Tufts and NEMC buildings have gates on their sewer lines to prevent City sewer backups from entering the building. All new Tufts and NEMC buildings have been designed to allow for separate storm and sanitary sewer hookups when constructed by the city.

MDC rules and regulations prohibit the introduction of certain wastes into the sewer system, require pretreatment of certain waste types, and require each industrial user to obtain a MDC discharge permit. As part of the Industrial Waste Program established by the MDC, site inspections and subsequent permitting was undertaken. In 1981, MDC staff inspected the New England Medical Center Hospital complex. Based on that inspection and information contained in the discharge permit application, the facility was issued a discharge permit. The conditions of the permit are listed in Table 2.8-1.

Pertaining to waste management practices for sewerage system discharge, Tufts and NEMC control the amount of radioactive waste discharged to the sewer, utilize silver recovery units and acid neutralization systems, reclaim waste solvents for handling by a hazardous waste contractor, and have grease traps installed at appropriate locations (e.g., kitchens).

Guidelines for the discharge of radioactive materials are established by the U.S. Nuclear Regulatory Commission (NRC). Standards covering the disposal of radioactive substances into sanitary sewerage systems are found in 10 CFR 20.303.

TABLE 2.8-1

MDC DISCHARGE PERMIT CONDITIONS

1. Must comply with applicable MDC and federal regulations.
2. MDC must be allowed facility access.
3. Any changes which may affect the permit must be reported to MDC
4. MDC must be notified in the event wastes not covered in the permit are discharged to the sewer.
5. Discharge characteristics must reflect information contained in the permit application.
6. pH levels must be between 5.5 and 9.5.
7. Any solids/sludge resulting from industrial or pretreatment processes shall not be discharged.
8. Radioactive wastes cannot be discharged in excess of regulated amounts.
9. A greater than 15% increase in the amount discharged is not allowed until permit is modified.
10. Discharge of flammable liquids is prohibited
11. Silver can not be discharged to the system.

Tufts and NEMC are licensed by NRC for use of radioactive materials in research and medical treatments. Radioactive discharges to the sewer system are carefully controlled to assure compliance with limits established by NRC.

Silver recovery units are utilized in photographic labs to keep silver from being discharged to the sewer system. In addition, acid neutralization units are utilized. Newer buildings have centralized units (e.g., the new hospital center), while older laboratories utilize marble chips and dilution tanks at individual acid sinks.

Waste Management

Tufts and NEMC facilities generate municipal, hazardous and radioactive wastes. Each waste is handled in accordance with federal and state regulations.

Tufts and NEMC have a central coordinator for radioactive waste management. Radioactive waste is generated in the NEMC hospital, the Medical School and many laboratories. Approximately 20, 55-gallon drums of low-level radioactive waste is generated each month. A radioactive waste management contractor is on call to remove the drums when necessary. Prior to pick up, the drums are stored in a vented storage area. Radioactive waste from Tufts and NEMC is currently transported to Richland, Washington for disposal. This facility is the only one which accepts radioactive waste mixed with organic solvents (e.g., acetone).

Hazardous waste is defined by state and federal regulations (Environmental Protection Agency Standars promulgated pursuant to the Resource Conservation and Recovery Act - RCRA - and Massachusetts Department of Environmental Quality Engineering regulations promulgated pursuant to the Hazardous Waste Management Act.) Both Tufts and NEMC generate hazardous waste and, therefore, have been assigned a state and federal hazardous waste identification number.

In order to not be classified as a hazardous waste storage facility, Tufts and NEMC do not store any hazardous waste for more than 90 days. Hazardous waste disposal is contracted through state and federally licensed transporters who deliver the waste to licensed facilities in accordance with the manifest. The majority of hazardous wastes are generated in the laboratories. The various waste types generated include:

- reactives
- waste solvents (mainly acetone)
- housekeeping chemicals
- miscellaneous laboratory wastes (mixed organics)

Hazardous infectious wastes are disinfected in autoclaves in accordance with Massachusetts regulations. After the wastes are autoclaved, they become non-hazardous. Hazardous physical wastes are burned in a state approved incinerator.

It is not yet possible to accurately estimate the amounts of hazardous waste generated at the Tufts and NEMC complex. NEMC is in the process of conducting a detailed chemical inventory to better estimate waste quantity and to develop central control over all chemical usage. Tufts estimates that there is about one pickup per month of hazardous waste. At a maximum, one pickup would include 20 55-gallon drums with the majority of the waste being acetone which is used in enzyme research.

Municipal ("solid") waste is deposited in dumpsters located throughout the complex. The amount of waste generated is estimated to be about 550 cubic yards per week or about 30,000 cubic yards per year. The municipal waste contains no hazardous waste which is clearly stated in the contract between Tufts, NEMC and the waste, contractors.

3 ENVIRONMENTAL IMPACTS OF THE PROPOSED MASTER PLAN

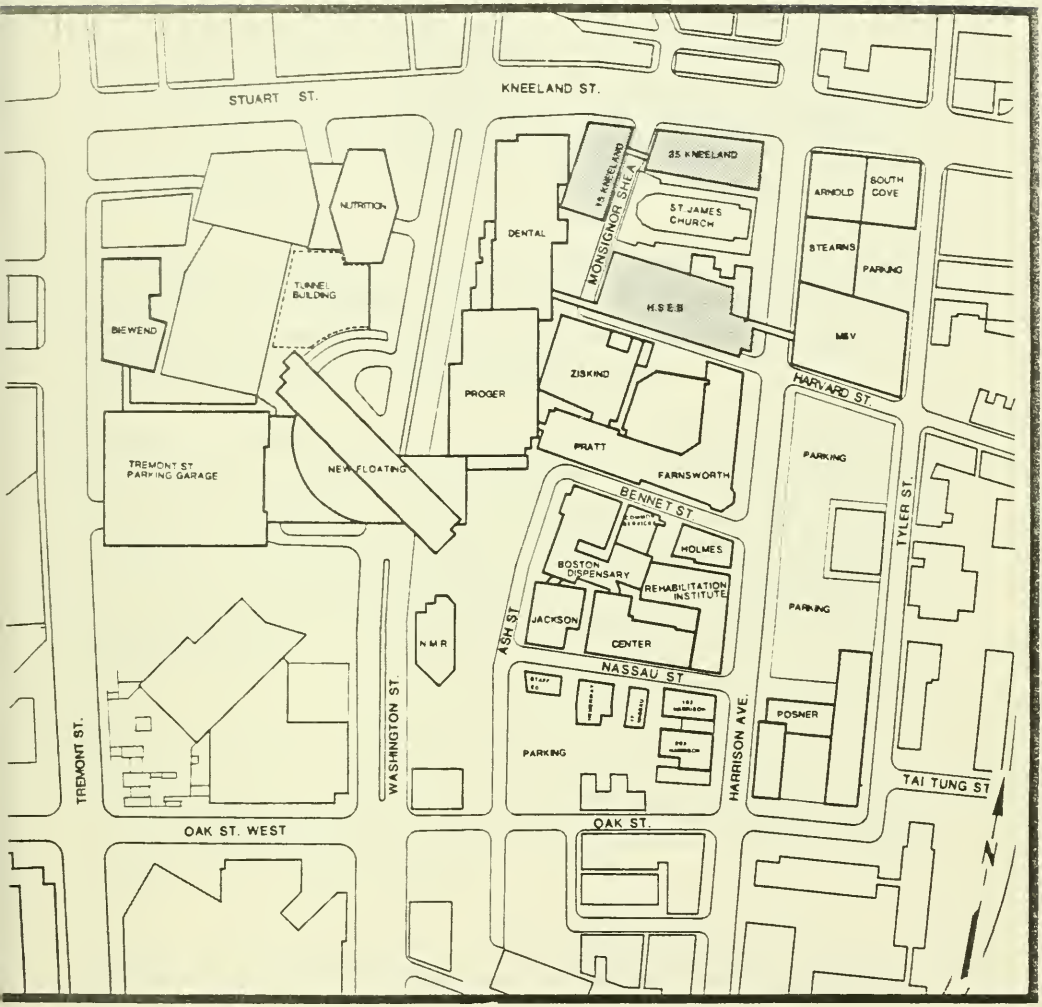
3.1 OVERVIEW OF MASTER PLAN PROJECT COMPONENTS

3.1.1 1982-1985 Project Development

Figure 3.1-1 illustrates the project development planned by Tufts University and New England Medical Center for the period 1982 to 1985. The major new facilities planned for the 1982-1985 period include Tufts University's Health Sciences Education Building and the joint development planned for 15 and 35 Kneeland Street. Facilities under construction in 1985 include New England Medical Center's NMR and Tunnel Buildings.

The Health Sciences Education Bulding site is located on the northwest corner of the Harrison Avenue - Harvard Street intersection adjacent to the St. James church. The building will consist of 133,480 square feet. Construction is programmed to start in spring 1983 with the facility completed by 1985. The building is being developed by Tufts to provide larger and more modern instructional, library and educational support space for existing activity in the downtown campus. Approximately 90% of the staff occupying the building will be transferring from other facilities. The remaining 10% of the building's occupancy, an estimated 50 people, will be new to the downtown campus.

Tufts University and New England Medical Center
Facilities Master Plan — Campus Plan 1985



LEGEND
Facilities To Be Developed

0 50 100 200 400 Feet

Figure 3.1-1 Master Plan Project Development 1983-1985

The joint development research space in the 15 Kneeland Street Building will total 73,500 square feet. The building's population will consist primarily of persons transferring from other facilities in the complex. New employment in 15 Kneeland Street are expected to total 100 persons.

Administrative office space use is planned for the 78,400 square feet of space in the 35 Kneeland Street Building. All of the Tufts and New England Medical Center employment in the building will be tranfers from existing buildings in the downtown complex.

Table 3.1-1 summarizes the 1982-1985 project development activity. The total gross square footage associated with the projects listed in the table is 285,380. The projects will generate an estimated 150 new employees in the downtown complex. The 150 new employees represent a 1.5% increase over the 1982 total population of 9,850 persons for Tufts, New England Medical Center, and the U.S.D.A. Human Nutrition Research Center.

3.1.2 1985-1992 Project Development

A total of five projects are planned by Tufts and New England Medical Center for the period 1985 to 1992. Figure 3.1-2 locates the proposed projects in the downtown complex.

Tufts is planning development of two research oriented facility projects. The Posner Building is to be located on the site of the existing surface parking lot on Harrison Avenue across from the Pratt/Farnsworth building. The Posner Building will contain approximately 274,000 square feet of space primarily devoted to research and a central animal facility. The building will also contain approximately 100 parking spaces. An estimated 700 new employees to the downtown complex will occupy the facility. Construction is expected to commence in 1986 with occupancy by 1989.

The In-Fill Building site is located on the west side of Tyler Street between the South Cove and M&V Buildings. The proposed facility will

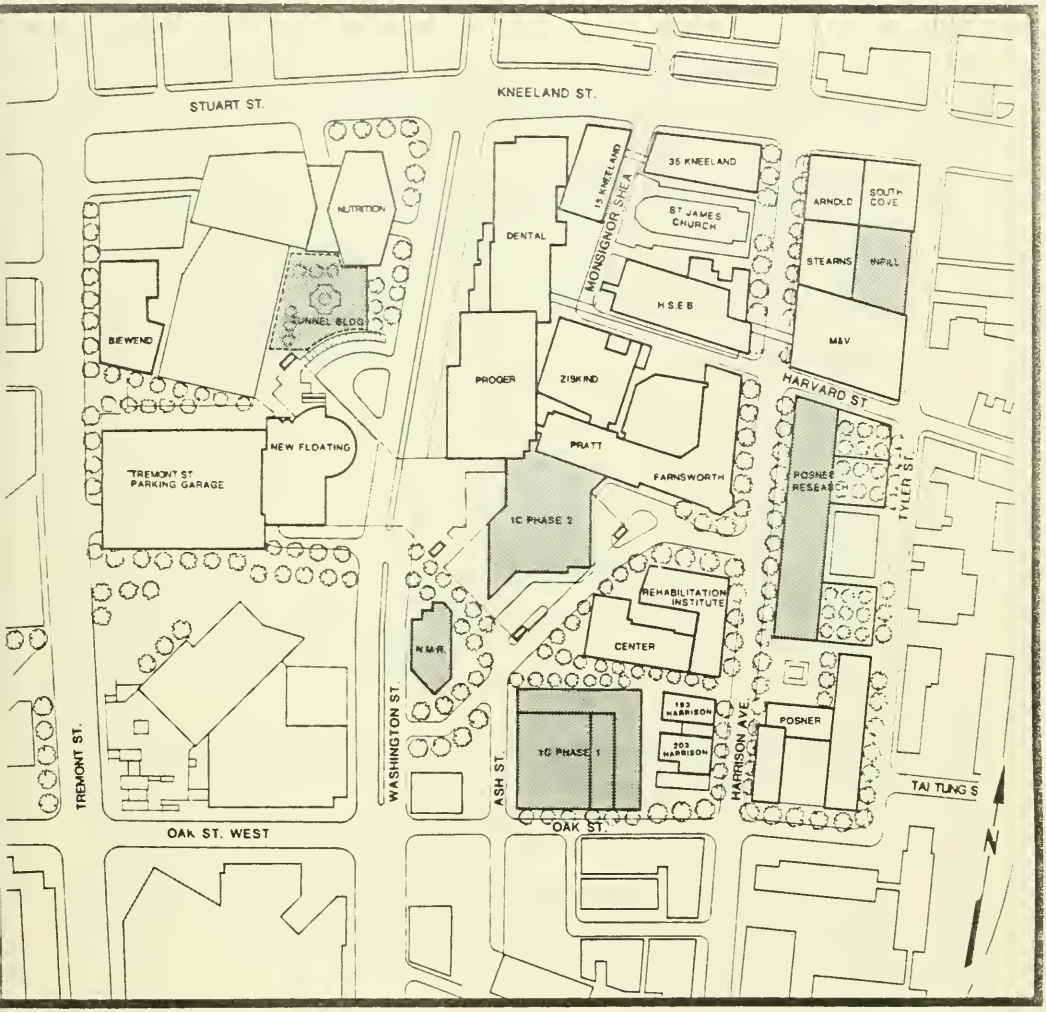
TABLE 3.1-1

TUFTS UNIVERSITY AND NEW ENGLAND MEDICAL CENTER

1982-1985 PROJECT DEVELOPMENT

Project	Project Scale (Gross Square Feet)	Construction Start Date	Date Project Complete	Estimated New Employment to Downtown Complex
• Health Sciences Education Building (Tufts)	133,480	1983	1985	50
• 15 Kneeland Street (Tufts & NEMC)	73,500	1983/1984	1985	100
• 35 Kneeland Street (Tufts & NEMC)	78,400	1983/1984	1985	-
Total All Projects	285,380	--	--	150

Tufts University and New England Medical Center
Facilities Master Plan — Campus Plan 1992



LEGEND
Facilities To Be Developed

0 50 100 200 400 Feet

Figure 3.1-2 Master Plan Project Development 1986-1992

total 61,600 square feet of research space. The estimated 300 employees in the In-Fill Building will be new to the downtown complex.

The major new facility planned by New England Medical center for the 1985-1992 period is the "1C" Building project. The 402,000 square feet of space within the 1C Building is to be used for medical service functions including replacement of the existing medical and surgical beds in the Pratt/Farnsworth Building, replacement and expansion of the existing Emergency Room and expansion of the hospital's support facilities. The 1C Building will be located on a development site contiguous to the New Floating Hospital and Proger Building. The Phase 1 component of the 1C Building project bounded by Oak Street - Ash Street and Nassau Street will contain a parking facility on the lower levels totalling 300 spaces. The majority of the medical staff and employees in the 1C Building will transfer from other facilities in the downtown complex. An estimated 100 new employees will be generated by the operation of the facility. Construction of the "1C" Building will start in 1986 with the facility completed in 1989.

The proposed Tunnel Building on Washington Street will contain 10,000 square feet of space devoted to New England Medical Center's computer data operatons, as well as providing a tunnel connection between the New Floating Hospital and the Nutrition Research Center. The 50 people employed in the facility will transfer from other space in the downtown complex. The NMR Building will have a total area of 3,000 square feet. Existing New England Medical Center staff will use the facility.

Table 3.1-2 summarizes the project development activity planned for the period 1985 to 1992. A total of 750,600 square feet of new building construction is planned. The facilities when occupied will generate an additional 1100 employees in the downtown complex.

TABLE 3.1-2

TUFTS UNIVERSITY AND NEW ENGLAND MEDICAL CENTER

1985-1992 PROJECT DEVELOPMENT

Project	Project Scale (Gross Square Feet)	Construction Start Date	Date Project Complete	Estimated New Employment to Downtown Complex
• Posner Building (Tufts)	274,000	1986	1989	700
• Tyler In-Fill Building (Tufts)	61,600	1988	1990	300
• "1C" Building (NEMC)	402,000	1986	1989	100
• Tunnel Building (NEMC)	10,000	1985	1986	--
• NMR (NEMC)	3,000	1985	1986	--
Total All Projects	750,600	--	--	1100

3.1.3 Total 1982-1992 Master Plan Project Development

From the perspective of total 1982-1992 Master Plan project activity, the combined facility development planned by Tufts and New England Medical Center will consist of 1,035,980 gross square feet of space. The majority of the employment associated with this new space will be tranfers from existing facilities in the downtown complex. The new employment associated with the Master Plan projects will total an estimated 1250 persons.

The net result of the Master Plan projects from the perspective of activity scale are as follows:

- Building square footage will increase from the 1982 space utilization of approximately 1.81 million square feet to approximately 2.10 million square feet in 1985 and 2.85 million square feet in 1992.
- Total combined employees, patients and visitors for the University and medical complex will increase from 9,850 persons in 1982 to 10,000 persons in 1985 and 11,000 persons in 1992.

3.2 LAND USE

3.2.1 1985 Land Use Analysis

The objectives of the land use analysis are to: (1) identify the relationship of the Master Plan project components to general area development and (2) determine what impacts could occur on either the physical character or quality of adjacent land uses.

Land Use Interrelationships

The Health Sciences Education Building (HSEB) site is located on Harrison Avenue between Harvard Street and St. James Church. Located interior to the general Tufts and NEMC site boundary consisting of Kneeland and Stuart Streets on the north, Tyler Street on the east, Tremont Street on the west, and Oak Street to the south, HSEB is across from the M&V Building to the east, Pratt-Farnsworth on the south, and the Dental Health Sciences Building on the west. The only potential land use conflict is with the St. James Church to the north. Discussions between Tufts and church officials have resulted in a site development plan that addresses the needs and concerns of the church's operation. The majority of the site is currently used for parking.

The 15 and 35 Kneeland Street projects are located along the northern edge of the Tufts and NEMC complex. Kneeland Street, a major east-west arterial, serves as a buffer between the proposed research and administrative uses planned for the two facilities and the Chinese neighborhood activity north of the street.

Design Considerations

HSEB will be nine stories above grade and contain 134,000 gross square feet. The building will have bridge connections with the Dental

Health Sciences Building and with M&V at the fourth floor level. In terms of the vertical envelope formed by surrounding buildings, M&V is 8 stories in height, Pratt/Farnsworth 6 stories, and the Dental Health Science Building 9 stories. The St. James Church is approximately 8 stories in height.

No wind impacts are expected from HSEB. High winds are problems in Boston in narrow street canyons characterized by high development densities where tall structures tend to funnel and intensify the prevailing wind conditions. The buildings proposed in the Master Plan are of varying height and shape and generally maintain the existing vertical envelope. This reduces the potential for wind funneling effects.

The exterior of HSEB will be of a design consistent with existing buildings. The Harrison Avenue facade will be set back from the curb line to allow for tree planting and pedestrian movement. Current plans call for creating a quiet courtyard, opening off Harrison Avenue, between HSEB and St. James Church. In addition to the site amenities, the auditorium in HSEB will be available for use during off-hours by community groups in the neighborhood.

The 15 and 35 Kneeland Street projects consist of renovating existing building structures. Recognizing the needs of the adjacent neighborhood residents, commercial uses will occupy the first floor of both buildings.

3.2.2 1992 Land Use Analysis

Land Use Interrelationships

The major action planned by NEMC in the 1985 to 1992 timeframe is the 1C Building Project. The main hospital component of the project will be located on the site bordered by Bennet Street, Ash Street and

Nassau Street. The facility will be interconnected with both the new Floating Hospital and the Proger Building. A secondary component of the 1C Project consists of a building with 300 parking spaces on the lower levels and office use on the upper floors. This structure will be located on the block bordered by Nassau Street, Ash Street and Oak Street.

Both components of the 1C Project will require demolition of a limited number of existing structures. The site of the main 1C Hospital building will require demolition of the office building at 37 Bennet Street, the buildings at 2 Ash Street and 20 Ash Street. All three of the structures requiring demolition are owned by NEMC.

The parking garage and office component of the 1C Project will require demolition of several existing NEMC office buildings along Ash Street, Nassau Street and Oak Street.

Pertaining to land use interrelationships, the main hospital building of the 1C Project will be entirely surrounded by facilities used for medical services. Therefore, no potential exists for conflict with residential land use to the south or east. Washington Street physically separates the 1C Project from the Don Bosco School development area.

The parking and office component of the 1C Project will back on Oak Street. Because of the proximity to residential and community activity south of Oak Street, the design of the structure will require careful consideration of massing, exterior design, facade treatment, and set-backs to avoid conflicts with existing land uses. The Phase 1 building containing the parking and office components of the 1C Project will step-up in height from Oak Street, achieving its maximum height on the site portion most interior to NEMC. By maintaining the existing vertical scale as close as possible along Oak Street, the massing impact on non-NEMC land use is minimized.

The two other projects planned by NEMC in a 1985 to 1995 context, the NMR and Tunnel Buildings, are of sufficiently small scale and located interior to the complex to avoid a conflict with neighborhood land uses.

The Posner Research Building proposed by Tufts will be located on the site of the existing Harrison Avenue surface parking lot opposite Pratt/Farnsworth. Abutted to the north, west, and south by existing university and medical facilities, the only potential for conflict with adjacent residential and community land uses exists on the east along Tyler Street. Because of the proximity of the site to this neighborhood land use, consideration needs to be given to massing, exterior design, facade treatment, and set-backs to avoid potential conflicts. As in the case of Phase 1 of the 1C Project, the Posner Research Building will step-up from Tyler Street and achieve its maximum height interior to the complex along Harrison Avenue. The vertical envelope of the adjacent residential structures will be maintained on the portion of the site contiguous to Tyler Street.

Land use on the east side of Tyler Street across from the In-Fill Building consists of garment industry activity and the Chinatown-South Cove YMCA recreation facilities. Given the scale of the proposed In-Fill Building, no adverse impacts are expected.

Design Considerations

Both the 1C Building and the Posner Research Building will increase slightly the vertical envelope associated with the Tufts and NEMC complex. The 1C Building will be 15 stories in height and Posner Research Building 12 stories. The In-Fill Building on Tyler Street will be 9 stories in height.

All of the facilities proposed for development in a 1985 to 1992 timeframe will account for the following design considerations to minimize the potential for conflict with surrounding land use:

- Use of site set-backs to maximize pedestrian walkways and provide buffer areas with neighborhood land use on the west across Tyler Street and south of Oak Street

- Step-up building elevation with maximum height on portion of development sites most interior to university and medical complex.

- Points of user access and egress will be interior to the University and Medical complex to avoid routing vehicles or pedestrians through residential neighborhoods

- Use of tree plantings and landscaped green areas to maximize aesthetic character of site development

- Use of exterior building treatment consistent with existing features of area.

3.3 TRANSPORTATION

3.3.1 1985 Transportation Impacts

Project Trip Generation

Demand on the transportation system components serving the downtown complex will increase slightly due to the 150 additional persons employed in the facilities planned for development between 1982 and 1985. In addition to the new employees, it is estimated that person trip activity will increase by approximately 200 trips daily due to growth in outpatient treatment and visitation.

Employee travel mode split to Tufts and New England Medical Center will differ from the distributions for outpatient and visitor travel due to the difference in trip characteristics. Employee mode splits were computed using both parking utilization information for the downtown complex and the BRA's 1979 Office Employee Travel Survey for downtown Boston. Based on analysis of both data sources, it was determined that approximately 32% of the employees will drive to work, 55% will take the MBTA rapid transit lines, 6% will use bus, 5% will walk, and 2% will use commuter rail or taxi.

The mode split for non-employee travel was based on the results of a survey of the downtown complex completed by Perry Dean Partners for New England Medical Center. The survey indicated the following mode split distribution for visitor and outpatient travel: auto 57%, taxi 10%, railway 12%, bus 8%, subway/bus 4%, commuter rail 1%, walk 4%, and other 4%.

Applying the mode split distributions to the trip generation totals results in the additional demand shown in Table 3.3-1. On a daily basis, a total of 350 trips inbound and 350 trips outbound will be made.

TABLE 3.3-1

MASTER PLAN PROJECT GENERATED DAILY PERSON

TRIP ACTIVITY - 1985

Trip Generation Component	Two-Way* Total Trips	Travel Mode Distribution					
		Auto	Taxi	Subway	Bus	Walk	Other
Employee Travel	300	95	5	160	20	15	5
Non-employee Travel	400	230	40	50	50	15	15
Total	700	325	45	210	70	30	20

*Total inbound and outbound travel.

Vehicular Travel

Growth in travel demand on the street network adjacent to Tufts and New England Medical Center is attributable to three distinct elements:

1. Tufts and New England Medical Center project related trip generation.
2. Increases in trip generation attributable to parallel project development adjacent to Tufts and New England Mecical Center (i.e., - State Transportation Building, South Cove Renewal Project)
3. Growth in through (non-local) traffic movement on the street system.

By applying vehicle occupancy rates and temporal distribution factors to the person trip totals in Table 3.3-1, the A.M. and P.M. commuter peak hour vehicle generation totals for Tufts and New England Medical Center were computed. The growth in vehicle travel due to other project development and through traffic movement was calculated using travel forecast information from the Central Transportation Planning Staff (CTPS). The data supplied by CTPS was developed under contract with the Massachusetts Department of Public Works as part of the on-going Central Artery Study.

The resulting 1985 peak hour travel demand for the area street network are shown in Figures 3.3-1 and 3.3-2. Capacity analysis were performed for the key intersection areas using the 1985 projected peak hour traffic demand to determine if the operating level of service is affected by the additional traffic. The results of the analysis indicated that no reduction in operating level of service from current conditions is expected in 1985.

Figure 3.3-1 1985 AM Peak Hour Traffic Demand

Figure 3.3-2 1985 PM Peak Hour Traffic Demand

Public Transportation

Of the 210 additional daily subway riders projected in 1985 for Tufts and New England Medical Center, an estimated 70 will use the system during the PM commuter peak hour. Adequate capacity exists at the MBTA stations serving the downtown complex to accommodate this additional demand. Accessibility to the Orange Line service will improve due to the construction of the Medical Center/South Cove Station.

Parking

Daily demand for parking at the Tufts and New England Medical Center complex will increase slightly due to the additional employee and visitor outpatient automobile travel. The approximate 50 employees arriving by automobile will require an additional 40 parking spaces. The non-employee automobile travel will generate an additional parking demand for approximately 75 spaces. In a manner consistent with the parking policy of Tufts and NEMC, priority will be given to meeting the additional parking needs of patients and visitors. The 50 additional spaces required for employee parking will be met by off-site private parking facilities through leasing arrangements.

Construction Traffic Impact

Construction related transportation impacts are attributable to both truck traffic and construction worker travel. In assessing construction impacts of the project activity included in the Master Plan, analogies were developed with other Boston area urban project environmental assessments prepared by ERT. This approach was necessitated by the programmatic nature of the Master Plan. The traffic impact presented is viewed as a representative scenario associated with construction of a major building.

Truck traffic will vary considerably throughout the typical 32- to 36-month construction period. During the site preparation phase, a maximum of two to three heavy trucks per hour will arrive and depart the site. This traffic, resulting in about 20 to 30 heavy trucks per day, will be spread evenly over the day. Truck routes will be developed which will minimize the effects of this type of traffic on major arterial streets.

Truck traffic associated with construction of the new building will not be as intense, but may be of longer duration. Eight to ten heavy trucks per day can be expected throughout the construction period. Heavy truck activity is more likely to peak during erection of the superstructure. At that time, for a four to five-month period, between 10 and 15 trucks per day should be anticipated. These trucks, which will be hauling structural materials, are likely to have long loads and will require coordinated routing through the city to the construction site. Heavy truck activity during peak commuter peiods is normally minimized. Provision will be made for adequate loading/unloading areas, and temporary stopping or queueing zones for heavy trucks.

Most construction workers will probably drive to the site in private vehicles. This is generally true because tradesmen utilize their own tools and do not leave their personal equipment on-site. The tools are stored in the tradesmen's private autos and light trucks.

Occupancy per vehicle is also usually quite low due to the predominance of light trucks and the preference for nontraditional commuting patterns. It is assumed that only 10% of the peak labor force will arrive at the construction site by public conveyance (i.e., either subway or bus). Of the remaining work force, it is assumed that all will prefer to use private autos with an average occupancy rate of 1.1 worker per vehicle. Based on an average on-site

construction employment of 150 workers, an estimated 120 autos and light trucks will be used by the construction labor force at peak employment levels.

Construction worker commuting usually occurs before the regular morning commuter peak and evening commuter peak. As a result, the impact of construction worker vehicles on streets near to the project site is not expected to have a significant effect on overall traffic. In addition, the spatial distribution of the available parking supply for construction worker vehicles will help to reduce the concentration of additional traffic demand immediately adjacent to the site.

3.3.2 1992 Transportation Impacts

Project Trip Generation

A total of 1100 new employees will be located in the downtown complex due to project development planned for the 1985-1992 period. Non-employee travel to Tufts and New England Medical Center is expected to increase by approximately 300 trips per day for the 1985 to 1992 period. The total net transportation system demand increase for the 1982 to 1992 Master Plan period is 1250 employee trips and 500 non-employee trips daily.

Table 3.3-2 summarizes the additional daily person trip activity generated by Tufts and New England Medical Center in 1992. On a daily basis, a total of 1750 trips inbound and 1750 trips outbound will be made.

Vehicular Travel

The projected 1992 A.M. and P.M. commuter peak hour demands for the street system adjacent to Tufts and New England Medical Center are shown in Figures 3.3-3 and 3.3-4. The traffic projections include the

TABLE 3.3-2

MASTER PLAN PROJECT GENERATED DAILY PERSON

TRIP ACTIVITY - 1992

Trip Generation Component	Two-Way* Total Trips	Travel Mode Distribution					
		Auto	Taxi	Subway	Bus	Walk	Other
Employee Travel	2500	800	25	1375	150	125	25
Non-employee Travel	1000	570	100	120	120	40	50
Total	3500	1370	125	1495	270	165	75

*Total inbound and outbound travel.

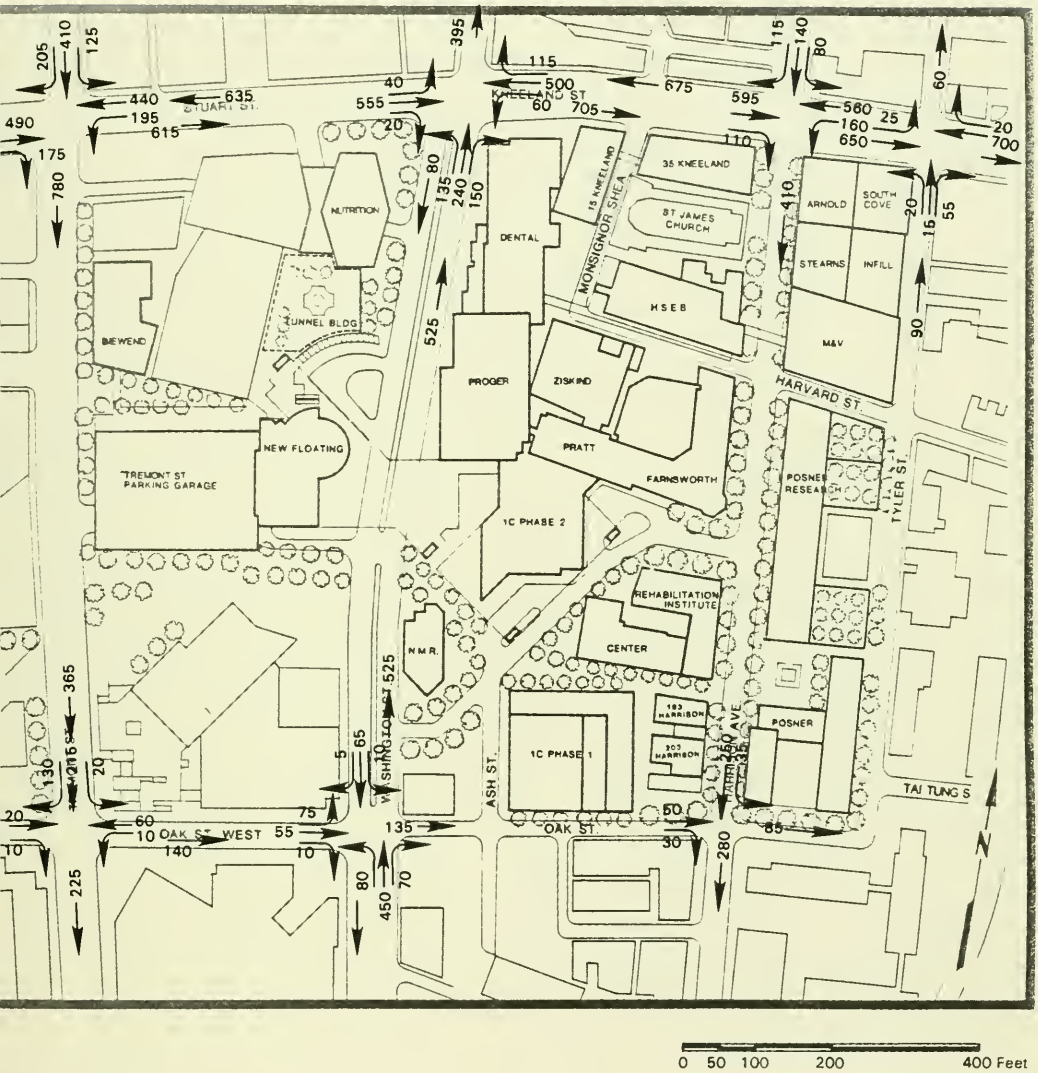


Figure 3.3-3 1992 AM Peak Hour Traffic Demand

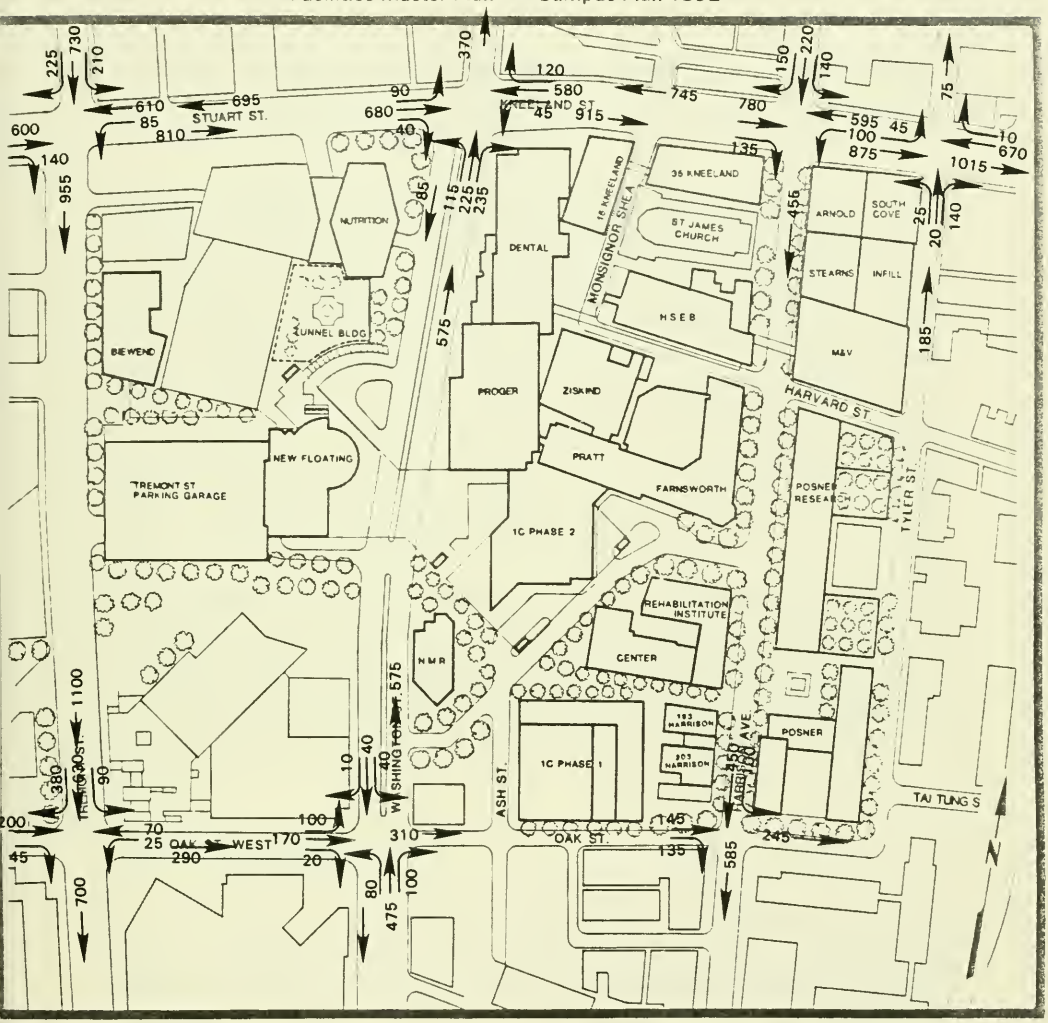


Figure 3.3-4 1992 PM Peak Hour Traffic Demand

increment of automobile and taxi traffic generated by the Tufts and New England Master Plan projects, other "local" project development, and growth in through traffic movement.

Capacity analyses were performed for the key intersection areas adjacent to Tufts and New England Center using the 1992 peak hour projections. The results of the analyses indicated that the intersection of Kneeland Street and Harrison Avenue would operate at a Level of Service D condition for both the A.M. and P.M. commuter peak hours. The Kneeland Street - Stuart Street - Washington Street intersection would operate in a lower range Level of Service D during the A.M. peak hour and Level of Service E during the P.M. peak hour. The Tremont Street and Stuart Street intersection would operate at Level of Service E for both commuter peak hours.

The reduction in Level of Service in 1992 is attributable to the cumulative growth in traffic on the street system and not just the vehicle generation associated with Tufts and New England Medical Center project actions. The maximum additional peak hour generation projected for Master Plan projects in 1992 is approximately 275 vehicles.

Public Transportation

Of the projected 1495 additional persons using the subway from Tufts and New England Medical Center in 1992 on a daily basis, approximately 510 will use the system during the P.M. peak hour. The most critical operational period is during the P.M. commuter peak hour, when the work-to-home outbound movement from Tufts and New England Medical Center results in the maximum utilization of subway station entrances, vertical circulation facilities such as stairs and escalators, and turnstiles. Based on review of the capacity of each MBTA station used by Tufts and New England Medical Center riders, it was determined that all of the stations utilized will operate within capacity.

Parking

Tufts and New England Medical Center project development in a 1992 timeframe will generate an additional parking demand for approximately 320 employee spaces and 190 visitor spaces. The proposed 500 space off-site parking garage currently being evaluated by Tufts and NEMC and the 100 parking spaces proposed for the Posner Research Building will accommodate this additional parking demand.

Construction Traffic Impact

Construction worker trip activity associated with Tufts and New England Medical Center project development is not expected to have any impact on the overall street and public transportation operations during commuter peak hours because of the temporal distribution of construction worker commutation patterns. Construction workers generally arrive on-site by 7:30 A.M. and leave by 3:30 P.M. to 4:00 P.M. Given these typical operating hours, commuting construction workers will not affect either the 7:45 - 8:45 A.M. peak hour or the 4:30 - 5:30 P.M. peak hour commuting periods.

Construction truck activity will correspond to the typical 7:30 A.M. - 3:30 P.M. construction operating hours. Some impact on the 7:45 - 8:45 A.M. peak hour will occur. Through consideration of routing alignments and provisions of adequate curb-side or off-street loading/unloading areas, the impact construction trucks have on the adjacent street system can be minimized. In the afternoon, no truck activity would be expected after 3:30 P.M. Trucks will thus generally avoid the 4:30 - 5:30 P.M. commuter peak hour.

3.4 AIR QUALITY

3.4.1 1985 Environmental Conditions

Description of Environmental Conditions

The year 1985 represents the proposed completion date of several projects included in the ten year Master Plan. The completion of these projects will affect both total stationary source emissions at Tufts and NEMC and local and regional indirect emission sources surrounding the project site.

Stationary Sources

By 1985, the operations at the Tufts and NEMC complex will include emissions of SO_2, TSP, NO_x and CO from the following new stationary sources:

- 15 Kneeland St. Building - NEMC and Tufts
  - i) one emergency diesel generator rated at 300 kw
  - ii) additional cooling towers - 1,500 tons.

It has been assumed in determining pollutant emission rates that the emergency diesel generator unit will operate a maximum of 100 hrs/year or approximately two hours/week as in the 1982 baseline case. Table 3.4-1 lists pollutant emission rates representative of these operating conditions. A No. 2 diesel fuel with a maximum sulfur content of 0.3% was assumed in deriving these emission rates.

Indirect Sources

In the 1985 indirect source analysis, two options have been considered. The first is the 1985 no-build option which assumes that the 10 year Master Plan has not been implemented. Traffic has been considered to grow at the growth rate projected by CTPS. The projected no-build growth rate represents a 3.2% increase over the 1982 baseline case.

TABLE 3.4-1

EMISSION RATES FOR ADDITIONAL TUFTS AND NEMC EMERGENCY DIESEL GENERATORS IN 1985

	15 Kneeland Street	
Capacity (Kw)	300	
Fuel Consumption (gal/hr)*	23	
Fuel Type*	Diesel, No. 2 (0.3%S)	
Emissions Rates	lbs/hr	TPY
SO_2	1.02	0.05
TSP	0.30	0.02
NO_X	8.48	0.42
CO	5.16	0.26

* Assumed fuel consumption and fuel type.

The second option is the 1985 build case which represents partial completion of the 10 year Master Plan. Traffic volumes in the 1985 build case have been projected to be 4.0% above the 1982 baseline case.

The two intersections modeled in the 1982 baseline case have been modeled in the 1985 cases also. Receptor locations represent the sites where maximum concentrations were predicted in the 1982 baseline case. Only 8-hour CO concentrations have been determined since they are most constraining and since 1-hour concentrations are expected to be well below appropriate standards.

Tufts and NEMC Construction Impacts

Under the proposed 10 year Master Plan, several phases of construction activity will occur from 1982 through 1992. It is assumed that all construction will have ended by 1992. The construction of new buildings, parking areas, etc., associated with the 10 year Master Plan will result in several dust-producing activities. Those activities expected to produce the greatest amounts of air-borne particulates are excavation and storage or transport of granular material during the construction periods. However, these activities will induce only periodic short-term TSP impacts in the project vicinity. For those construction activities which tend to produce the most significant volume of fugitive dust, the unmitigated impact would be greatest on hot, dry, windy days. It should be emphasized, however, that any TSP impacts resulting from Tufts and NEMC construction activities can be effectively mitigated by implementing proper fugitive dust control measures such as the following:

- restriction of vehicle flow on unpaved surfaces,
- watering twice a day during periods of high winds and construction activity,
- minimizing the period during which the cleared and regraded lands are exposed, and
- minimizing the periods when spoils are stored in the immediate vicinity of the construction site.

The implementation of the measures listed above should be adequate to reduce the fugitive dust impacts of construction within occupied areas surrounding the project site.

In addition, pollutant impacts associated with the operation of construction vehicles will be very minimal compared to that of normal traffic activities in the project area and will be only on a short-term basis.

Technical Evaluation

Stationary Sources

The operations at Tufts and NEMC by 1985, as presented in the previous section, results in a net increase in pollutant emissions from stationary sources at the project site. Net pollutant increases and total facility emissions are presented in Table 3.4-2 for comparison to the EPA de minimis emission rates.

As indicated in Table 3.4-2, net stationary source emission increases and even total stationary source emission rates resulting from expected 1985 Tufts and NEMC operations are less than 46% of the de minimis levels for all pollutants. As a result, it is expected that pollutant impacts associated with stationary source emissions at Tufts and NEMC in 1985 will be minimal for each pollutant.

In addition to the stationary sources discussed above, additional cooling towers totalling 1,500 tons are expected to be in operation by

TABLE 3.4-2

1985 STATIONARY SOURCE EMISSIONS AT TUFTS AND NEMC

Pollutant	Net Emissions Increase* (TPY)	Total Emissions (TPY)	DeMinimis Emission Rates (TPY)
SO_2	0.05	0.54	40
TSP	0.02	4.68	25
NO_x	0.42	18.33	40
CO	0.26	3.78	100

1985. The additional cooling towers are expected to serve to cool water associated with air conditioning and refrigeration units in the 15 Kneeland Street Building. The cooling towers do not emit any particulate matter and given the size and number of the new cooling towers and existing towers at Tufts and NEMC it is expected that drift and/or fogging, if any, will be negligible in 1985. Thus it is concluded that there exists no significant air quality pollutant impacts attributable to these sources.

Indirect Sources

A dispersion modeling analysis was performed to determine the impacts of indirect source emissions in 1985 assuming both no-build and Master Plan build scenarios. In the no-build option, the maximum 8-hour CO concentration predicted at the intersection of Kneeland/Stuart and Washington Streets was 8.6 mg/m^3. Adding to the background concentration of 2.3 mg/m^3 to this results in a total maximum 8-hour CO concentration of 10.9 mg/m^3 which is in excess of the 8-hour CO standard of 10 mg/m^3.

In the Master Plan build option, the maximum 8-hour CO concentration was predicted to be 8.7 mg/m^3 or, with background, 11.0 mg/m^3, which is also in excess of the 8-hour standard.

At the intersection of Kneeland and Harrison Avenues, the maximum 8-hour no-build CO concentration was predicted to be 7.6 mg/m^3 or 9.9 mg/m^3 with background. This concentration is 99% of the 8-hour standard. The maximum 8-hour CO concentration, assuming the Master Plan build option, predicted at the Kneeland and Harrison intersection was 7.7 mg/m^3, 10.0 mg/m^3 with background added. This maximum total concentration is equal to the standard.

The results of this 1985 analysis indicate an improvement over the 1982 baseline case even though traffic has been projected to increase. This is a direct result of the Federal Motor Vehicle Control Program which limits emissions on new vehicles.

At each intersection, the Master Plan build option has resulted in a maximum concentration only 0.1 mg/m^3 greater than in the no-build option. This is a result of the slightly greater projected traffic growth rate for the Master Plan build option compared to the no-build option (4.0% compared to 3.2%).

In addition to this localized CO analysis, it is clear that the Master Plan build option in 1985 compared to the 1985 no-build option will have an insignificant effect on regional CO, HC, and NO_x impacts. The major basis for this is that Master Plan project related traffic increases are only slightly above what would have been the normal increase in the no-build case.

Conclusions

By 1985, several projects involved in the Tufts and NEMC 10 year Master Plan will be completed. As a result, the 1985 analysis has considered two options, the no-build and Master Plan build options for comparative purposes. The no-build option assumes no 10 year Master Plan projects, while the build option assumes the completion of several Master Plan projects. The following conclusions can be drawn from this analysis.

- In the no-build option, stationary source emissions would be the same as in the 1982 baseline case, thus, minimal impacts would be expected for all pollutants.
- Indirect source emissions in the no-build case are again associated with predicted impacts greater than applicable standards. However, these predicted impacts have improved over the 1982 baseline impacts.

- In the Master Plan build case, the operation of several new stationary sources has been assumed. As in the 1982 baseline case, since total facility emissions are expected to be well below applicable de minimis emission rates, it is expected that impacts associated with these sources would be very small.
- Indirect source emissions of CO-associated with the build option are also predicted to result in concentrations in excess of the 8-hour ambient standard. However, these have also improved compared to the 1982 predicted baseline concentrations. In fact, the predicted 1985 build impacts are at most only 1% greater than the 1985 no-build impacts.
- The build option will not result in a noticeable increase in regional CO, HC, and NO_x concentrations compared to the no-build case.
- Impacts associated with construction related activities can be controlled using proper mitigation measures and are therefore expected to be very small.

3.4.2 1992 Environmental Conditions

Description of Environmental Conditions

The year 1992 represents the proposed completion date of the Tufts and NEMC's 10 year Master Plan. The completion of all projects associated with the plan will affect both total stationary source emissions at the complex and local and regional indirect source impacts surrounding the project site.

Stationary Sources

By 1992, the operations at the Tufts and NEMC complex will include emissions of SO_2, TSP, NO_x, and CO from the following new stationary sources in addition to those already discussed in the 1985 analysis:

- Infill Building - Tufts University
  - i) one emergency diesel generator rated at 500 kw
  - ii) additional cooling towers - 250 tons
- Posner Research Building - Tufts University
  - i) one emergency diesel generator rated at 500 kw
  - ii) additional cooling towers - 500 tons (on roof), and
- Building 1C - NEMC
  - i) one emergency diesel generator rated at 1,000 kw
  - ii) additional cooling towers - 1,500 tons

It has been assumed in determining pollutant emission rates that each emergency diesel generator unit will operate at a maximum of 100 hrs/year or approximately 2 hrs/week, as in the 1982 baseline case. Table 3.4-3 lists pollutant emission rates representative of these operating conditions. A No. 2 diesel fuel with a maximum sulfur content of 0.3% was assumed in deriving these emission rates.

Indirect Sources

In the 1992 indirect source analysis, two options have been considered, the no-build and Master Plan build options, as in the 1985 analysis. The no-build option assumes that the 10 year Master Plan does not exist. Traffic has been considered to grow at a growth rate projected by CTPS. The projected no-build growth rate represents a 10.7% increase over the 1982 baseline case.

The Master Plan build option assumes the completion and full implementation of the 10 year Master Plan. Traffic volumes in the 1992 build case have been projected to be 12.3% above the 1982 baseline case. This increase over the no-build case represents additional traffic generated by the 10 year Master Plan project implementation.

As in the 1982 baseline case and the two 1985 cases, the intersections at Kneeland and Harrison Avenues and Kneeland/Stuart and Washington Streets have been modeled. Receptor locations represent the site

TABLE 3.4-3

EMISSION RATES FOR ADDITIONAL TUFTS AND NEMC EMERGENCY DIESEL GENERATORS IN 1992

	Infill Building		Research Building		Building 1C	
Capacity (Kw)	500		500		1000	
Fuel Consumption (gal/hr)*	38		38		75	
Fuel Type*	Diesel, No. 2 (0.3%S)		Diesel, No. 2 (0.3%S)		Diesel, No. 2 (0.3%S)	
Emissions Rates	lbs/hr	TPY	lbs/hr	TPY	lbs/hr	TPY
SO_2	1.69	0.08	1.69	0.08	3.33	0.17
TSP	0.49	0.02	0.49	0.02	0.97	0.05
NO_x	14.02	0.70	14.02	0.70	27.67	1.38
CO	8.53	0.43	8.53	0.43	16.83	0.84

*Assumed fuel consumption and fuel type

where maximum concentrations were predicted in the baseline case. Only 8-hour CO concentrations have been determined since they are most constraining and since 1-hour concentrations are expected to be well below appropriate standards.

Technical Evaluation

Stationary Sources

The operations at Tufts and NEMC by 1992, as presented in the previous section, results in a net increase in pollutant emissions from stationary sources at the project site. Net pollutant increases, including those associated with projects completed in 1985, and total facility emissions are presented in Table 3.4-4 for comparison to the EPA de minimis emission rates.

The columns in Table 3.4-4 represent net emissions increases resulting from projects completed by 1985, net emissions increases resulting from projects completed between 1985 and 1992, net emissions increases above the 1982 baseline case resulting from implementation of the entire 10 year Master Plan in 1992, and total expected facility emissions in 1992. As indicated in Table 3.4-4, total stationary source emissions increases associated with the implementation of the entire 10 year Master Plan are considerably less than appropriate EPA de minimis emission rates. In fact, the expected pollutant increases for SO_2, TSP, NO_x, and CO are less than 2%, 1%, 8, and 2%, respectively, of the appropriate de minimis levels. As a result of these expected emissions increases, total facility emissions in 1992 for SO_2, TSP, NO_x, and CO will be 0.87, 4.77, 21.11, and 5.48 tons per year, respectively, also all well below the de minimis rates. As a result, it is expected that pollutant impacts associated with stationary source emissions at Tufts and NEMC in 1992 will be minimal for each pollutant.

In addition to the stationary sources discussed above, additional cooling towers totalling 2,250 tons from 1985 to 1992 and 3,750 tons

TABLE 3.4-4

1992 STATIONARY SOURCE EMISSIONS AT TUFTS AND NEMC

Pollutant	1985 Net Emissions Increase (TPY)	1985-1992 Net Emissions Increase (TPY)	Total 10 Year Master Plan Emissions Increase (TPY)	Total Plant Emissions (TPY)	DeMinimis Emission Rates (TPY)
SO_2	0.05	0.33	0.38	0.87	40
TSP	0.02	0.09	0.11	4.77	25
NO_x	0.42	2.78	3.20	21.11	40
CO	0.26	1.70	1.96	5.48	100

from 1982 to 1992 are expected to be in operation in 1992. The additional cooling towers are expected to serve to cool water associated with air conditioning and refrigeration units in the Infill Building, the Posner Research Building, Building 1C, and the 15 Kneeland Street Building. The cooling towers do not emit any particulate matter and given the size and number of the new cooling towers and existing towers at Tufts and NEMC, it is expected that drift and/or fogging, if any, will be negligible in 1992. Thus it is assumed that there exists no significant air quality pollutant impacts attributable to these sources.

Indirect Sources

A dispersion modeling analysis was performed to determine the impacts associated with indirect source emissions in 1992 assuming both no-build and Master Plan build scenarios. In the no-build option, the maximum 8-hour CO concentration predicted at the intersection of Kneeland/Stuart and Washington Streets was 7.4 mg/m^3. Adding the background concentration of 2.3 mg/m^3 to this results in a total maximum 8-hour CO concentration of 9.7 mg/m^3 which is 97% of the ambient standard.

In the Master Plan build option, the maximum 8-hour CO concentration was predicted to be 7.6 mg/m^3 or, with background 9.9 mg/m^3, or 99% of the ambient standard.

At the intersection of Kneeland Street and Harrison Avenue, the maximum 8-hour no-build CO concentration was predicted to be 6.1 mg/m^3 or 8.4 mg/m^3 with background. This represents 84% of the 8-hour standard. The maximum 8-hour concentration assuming the build option, predicted at the Kneeland and Harrison intersection was 6.3 mg/m^3, 8.6 mg/m^3 with background added. This represents 86% of the federal and state 8-hour CO standard.

The results of the 1992 analysis indicates an improvement over both the 1982 baseline case and both 1985 cases. In fact, applicable

standards have been met in 1992. At each intersection, the Master Plan build option has resulted in a maximum concentration only 0.2 mg/m^3 greater than in the no-build option. This is a result of the slightly greater projected traffic growth rate for the build option compared to the no build option (12.3% compared to 10.7%).

In addition to this localized CO analysis, it is clear that the build option in 1992 compared to the 1992 no-build option will have an insignificant effect on regional CO, HC, and NO_x concentrations. Since project related traffic increases are only slightly above what normal traffic growth would be and since this growth is confined to such a small core area, differences between no-build and build regional impacts will be very small.

Conclusions

By 1992, all projects involved in the 10 year Master Plan were assumed to be completed. As a result, the 1992 analysis has considered two options, the no-build and Master Plan build options. The no-build option assumes no 10 year Master Plan while the build option assumes implementation and completion of the 10-year plan. The following conclusions can be drawn from this analysis.

- In the no-build option, stationary source emissions would be the same as in the 1982 baseline case and the 1985 no-build case. As a result, minimal impacts would be expected for all pollutants.
- In the build case, the operation of additional stationary sources has been assumed. As in the 1982 baseline case and 1985 build and no-build cases, since total facility emissons are expected to be well below applicable deminimis emission rates, it is anticipated that impacts associated with these sources will be very small.
- Indirect source emissions associated with both the build and no-build options are predicted to result in air quality impacts within the appropriate standards. Predicted

concentrations have improved considerably over the previous two analysis years.

- Indirect source impacts associated with the build option are expected to be no more than 3% greater than those of the no-build option. This represents a very small increase.
- The build option will not result in a noticeable increase in regional CO, HC, and NO_x concentrations compared to the no-build case.
- As in the 1985 build case, construction activities should be associated with very minor short term impacts using proper mitigation measures.

3.5 NOISE

3.5.1 1985 Environmental Conditions

Description of Environmental Conditions with the Project

During the period 1982 through 1985, three structures (Biewend and 15 and 35 Kneeland Streets) will be renovated and one new building, the Health Sciences Education Building (HSEB), will be completed.

Contruction Noise

The major source of noise associated with the renovation of the 15 and 35 Kneeland Street buildings is expected to be truck traffic generated by debris removal and the supply of construction materials to the site. The major portion of activities associated with building renovation will take place within the structures and consist, generally, of quieter construction tasks such as partition wall removal, drywall installation and painting. The extent of truck traffic associated with work at these sites (an average of two to three per day) will represent a small proportion of the existing daily car and truck volumes at these locations.

The Health Sciences Education Building, to be built on Harrison Avenue adjacent to the St. James Church, will require use of a number of intrinsically noise intensive construction operations. The overall construction period for the planned building is expected to be approximately 24 months. During this time, the types, numbers, and locations of construction equipment will vary, depending on the particular phase of construction. These are typically excavation, pile driving, concrete pouring and crane operations. The details of construction equipment and scheduling requirements have not been developed at this time. However, an approximate indication of maximum noise level magnitudes associated with similar types of building construction is presented in Table 3.5-1, based upon a study conducted for NEMC's 1B building (ERT 1975).

TABLE 3.5-1

PREDICTED SOUND LEVEL AT RECEPTORS HAVING AN UNOBSTRUCTED VIEW OF CONSTRUCTION SITE*

Distance From Center of Construction Zone (feet)	Phase 1 Ground Clearing and Site Preparation (2 Months, 2 Front End Loaders, 7 Trucks)	Phase 2 Pile Driving (2 months with 2 Pile Drivers)	Phase 3 Concrete Pouring (6 Weeks, 4 Trucks)	Phase 4 Steel Erection (6 months, 2 Cranes)
50	85	98	81	78
100	79	92	75	72
200	73	86	69	66
500	65	78	61	58

* Based upon a representative set of construction conditions, source ERT 1975.

Noise sensitive receptors contiguous to the construction site will consist of pedestrians on sidewalks in the immediate vicinity of the site and occupants of nearby institutional use (classroom, research laboratories, etc) and religious use (St. James Church).

Operational Noise

The completed components of the Tufts and NEMC 10 Year Master Plan could generate exterior noise from the following three sources: (a) additional traffic, (2) rubbish-removal operations, and (3) heating, ventilation, and air conditioning (HVAC) fans and blowers.

The amounts of additional traffic due to all aspects of the Master Plan development are in the order of a 2 to 5 percent increase over existing university and medical complex traffic, depending upon the specific street facility. On this basis, noise due to additional traffic will be less than 1 to 2 dBA, a negligible (non-noticeable) magnitude.

Rubbish removal is expected to employ the roll off compactor container approach. This allows higher volumes of waste storage, less frequent truck pickups, and eliminates the "packing noise" associated with packer type trucks. Trash container areas are expected to be appropriately located, away from noise sensitive receptor areas.

The completed and operational Health Sciences Education Building will be designed with a modern central HVAC system. All fan and cooling tower sources are expected to be at or close to the roof top (approximately 10 stories above the street) and not contribute significantly to existing noise levels at either street level or at the locations of adjacent building occupants.

Technical Evaluation

City of Boston's Regulation 3.1 limits the maximum construction noise L_{10} at the lot line of residential zones properties to 75 dBA. Regulation 3.4 excludes impact devices such as pile drivers and jack hammers from control. Based on a review of these considerations, the condition where Boston construction noise regulations might be exceeded is at the adjacent St. James Church for brief periods of time during the initial phases of construction. This situation is due to the close proximity of the Church to the construction activity.

The effects of construction noise on people, in particular the noise from pile driving activity, will represent a definite source of potential annoyance to those people participating in Church functions during week days. For those other institutional buildings at slightly greater distances from the site with single pane windows in a masonry exterior wall, interior noise levels will be reduced 20 to 25 dBA or more, due to the sound transmission loss associated with the building exterior wall. Maximum interior noise levels in spaces of such buildings which face the construction are expected to be in the 50 to 60 dBA range for various time intervals during early stages of construction.

Conclusions

During the 1982-85 period, the only component of the Tufts and NEMC 10 Year Master Plan implementation which will result in significant noise generation will be the construction of the Health Sciences Education Building. The City of Boston Construction Noise Regulations may be briefly exceeded at times at the St. James Church. Possible mitigation measures could involve schedule shifting of either construction or church activity, or the use of noise control measures such as additional sealed glazing over church windows (which would also represent an energy conservation measure). Other components of the Master Plan, to be completed during this period, will be limited

to either renovation or building completion tasks, which do not result in appreciable exterior noise levels. The completion of the identified 1982-1985 project components will not result in changes in either the type or quantities of noise sources in the project area. Thus, no changes in noise levels or impacts due to the planned project operation in 1985 is anticipated.

3.5.2 1992 Environmental Conditions

Description of Environmental Conditions with the Project

During the period of 1985 through 1992, three major buildings will be constructed: 1) the NEMC "1C" building (in the vicinity of Ash, Bennet, and Nassau Streets), 2) the Posner Research Building on the site of the existing parking lot on Harrison Avenue and 3) the Tufts "Infill" Building, located on Tyler Street between the existing Tufts' South Cove and M&V buldings. These building sites are illustrated in Figure 3.1-2.

Construction Noise

The "1C" and "Infill" buildings will generally be constructed immediately adjacent to existing, occupied and functioning institutional spaces. Phase 1 of the 1C project will front on residential land use along sections of Oak Street. In addition, the Don Bosco School is located across the street from the 1C building. The Posner Research Building will be constructed adjacent to a small group of residential units on the west side of Tyler Street. Additional residences are scattered along the east side of Tyler Street in a mixed use (residential and commercial) occupancy. The entire area is zoned for commercial uses.

Noise levels at identified noise sensitive receptors will have magnitudes similar to those previously indicated in Section 3.5.1.

Operational Noise

As noted previously in Section 3.5.1, no appreciable changes in environmental noise levels will result from the operation of the completed Master Plan development.

Technical Evaluation

Construction of the Posner Research Building could potentially result in brief exceedances of the City of Boston Construction Noise Regulation and annoyance of building occupants at residences on the west side of Tyler Street. The extent and duration of such occurrences is a function of the actual location of the proposed building in terms of distance to the residences and practical methods used in construction. It is anticipated that construction will be generally limited to 5 days a week and a normal daylight hours schedule.

Conclusions

During the 1985-1992 portion of the Tufts and NEMC Master Plan development, there is the possibility of occasional exceedance of the City of Boston Construction noise regulations at the residences closest to the Posner Research Building.

The completed and operational project will not significantly alter the existing noise environment within and adjacent to the project area.

3.6 ENERGY

3.6.1 1985 Conditions

Description of Environmental Conditions with the Project

Table 3.6-1 presents the projected energy requirements for the Tufts and NEMC complex in 1985.

Technical Evaluation

Relative to the 1982 baseline energy requirements, projected 1985 energy usage is estimated to result in a 11 percent increase in steam and a 16 percent increase in electricity.

The new buildings will employ the latest technology to insure efficient energy usage and user comfort. For example, it is anticipated that waste heat recovery from steam condensation will be extensively employed, as a means of reducing the energy requirements for building hot water supplies. State and Federal codes will be adhered to and established as a base for investigation of optimum energy and economic considerations. Study of existing plant conditions, the code base, and future building requirements will dictate directions in temperature control, building envelope, and electrical distribution. Building systems will reflect the hospital's requirements for controlled patient comfort and service, and state of the art energy conscious design.

Conclusions

Based upon the data presented in Table 3.6-1, the 1982 to 1985 projections will require increases in steam and electricity, for year 1985 relative to 1982, in the following approximate annual amounts:

TABLE 3.6-1

ENERGY CONSUMPTION: YEAR 1985 CONDITIONS

Existing Building Units	Floor Area (Gross Square Feet)	Steam (10^3 pounds)	Electricity (10^3 kwh)
NEMC	1,060,000	118,898	22,623
TUFTS	552,000	59,611	14,692
USDA (Human Nutrition Research Center)	206,500	38,859	7,004
Subtotal (existing)	1,818,500	217,368	44,319
Proposed (Year 1985) Building Units			
NEMC			
15 Kneeland	73,500	6,400	3,000
35 Kneeland	78,400	7,000	1,700
Tufts			
Health Science & Education Building	133,480	11,637	2,827
Subtotal (proposed)	285,380	25,037	7,527
TOTAL, year 1985	2,103,380	242,405	51,846

Steam increase: 25,000,000 pounds
Electricity increase: 7,500,000 Kwh

No significant problems are anticipated with the future supply of these energy increases. Representatives of the supplier of these energy sources, Boston Edison, were contacted concerning future supply capability, U.S. load prediction data and transmission network conditions. Table 3.6-2 presents Boston Edison's future electricity capability vs peak load predictions, illustrating a reserve capability of greater than 10 percent of peak load beyond year 1990 (Boston Edison, 1982). Steam usage in downtown Boston has actually been decreasing (Boston Edison, 1982) as older buildings have been replaced with newer gas heated structures (Table 3.6-3). The Tufts and NEMC complex in 1985 would represent less than 3% of Boston Edison's current annual output.

3.6.2 1992 Conditions

Desription of Environmental Conditions with the Project

Table 3.6-4 presents the energy requirements for the Tufts and NEMC complex in the year 1992.

Technical Evaluation

Relative to the 1982 baseline energy requirements, projected 1992 energy usage is estimated to result in approximately a 42% increase in steam and 52% increase in electricity consumption.

Conclusions

Based upon the data presented in Table 3.6-4, the project will require increases in steam and electricity for year 1992 relative to 1982 in the following approximate annual amounts:

TABLE 3.6-2

ELECTRICITY; MAXIMUM CAPABILITY VERSUS PEAK LOAD FORECAST*

(MEGAWATTS)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Capability	2,626	2,900	2,885	2,975	2,966	3,006	3,006	3,006	3,007	2,789	2,782
Peak Load	2,135	2,145	2,166	2,178	2,216	2,267	2,321	2,378	2,434	2,497	2,581
Reserve Capability	490	755	719	797	750	739	685	628	572	292	201

*Summer peak loads indicated.
Source = Boston Edison Company, October 1982.

TABLE 3.6-3

STEAM; MAXIMUM CAPABILITY VERSUS PEAK OBLIGATIONS

(1000 POUNDS PER HOUR)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Capability	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560
Peak Obligations	1,634*	1,488	1,469	1,440	1,387	1,327	1,256	1,195	1,134	1,078	1,029
Reserve Capability	74	72	91	120	173	233	304	365	426	482	531

*Actual.
Source = Boston Edison Company, October 1982.

TABLE 3.6-4

ENERGY CONSUMPTION: YEAR 1992 CONDITIONS

Existing Building Units*	Floor Area (Gross Square Feet)	Steam (10^3 Pounds)	Electricity (10^3 kwh)
NEMC	1,060,000	105,243	20,291
Tufts	552,000	59,611	14,692
USDA (Human Nutrition Research Center)	206,500	38,859	7,004
Subtotal (existing)*	1,818,500	203,713	41,987
Proposed (Year 1985) Building Units			
NEMC			
15 Kneeland Street	73,500	6,400	3,000
35 Kneeland Street	78,400	7,000	1,700
Tufts			
Health Science & Education Building	133,480	11,637	2,827
Subtotal (proposed, 1985)	285,380	25,037	7,527
Proposed (Year 1992) Building Units			
NEMC			
1C	402,000	36,000	8,600
NMR	3,000	260	64
Tunnel	10,000	9	1,500
Tufts			
Posner Research	274,000	37,403	5,823
Infill	61,600	5,307	2,074
Subtotal (proposed, 1992)	750,600	78,979	18,061
Total, Year 1992	2,854,480	307,729	67,575
Net Increase relative to Baseline (Table 2.7-1)	1,035,980	90,361	23,256

*Reflects the demolition of buildings required to complete the future year developments indicated.

Steam increase: 90,000,000 pounds

Electricity increase: 23,200,000 Kwh

No signficant problems are anticipated with the future supply of these energy increases, per the discussion presented previously in Section 3.6.1.

3.7 INFRASTRUCTURE

3.7.1 1985 Environmental Conditions

Water Use

The increases in water use projected for 1985 are not expected to have any adverse impact on the City of Boston and MDC delivery systems. Water consumption by 1985 is expected to increase due to new building construction and rehabilitation of existing buildings not currently used by Tufts and NEMC. By 1985, three new or renovated buildings will be added to the medical complex. These include 15 and 35 Kneeland Street and the Health Sciences Education Building. The amount of water use associated with these new facilities is estimated to be about 300,000 cubic feet/year (2 million gallons/year). This represents an increase of about 10% over existing usage, bringing the annual total to about 3,200,000 cf/year or about 24 million gallons/yr. This increase is only 0.002% of the total average annual MDC usage and about 0.004% of the average annual City of Boston usage. The increase will result in the total Tufts and NEMC water usage being about 0.05% of the average annual City of Boston consumption. The total Tufts and NEMC water usage projected for 1985 is considered to be insignificant when compared to existing City of Boston and MDC usages.

Wastewater Discharge

Increases in wastewater discharged to the City of Boston and MDC sewer systems are not expected to result in any adverse impacts from a quantity or quality standpoint. The increase in the amount of wastewater generated by Tufts and NEMC in 1985 is assumed to be the same as the water consumption, about 2 million gallons/year. This represents about 0.002% of the average annual flow to the Deer Island Treatment Plant. The total amount of wastewater discharged (about

24 million gallons/year) amounts to about 0.02% of the current annual flow to the treatment plant. The projected increase is only about 0.01% of the increased daily flow that could be handled by the treatment plant (i.e., 62 mgd).

Wastewater discharges will be handled in the same manner as present, unless regulatory requirements and/or treatment technology advances dictate modifications to the existing system. Where required, new facilities will include acid neutralization systems, grease traps, silver recovery units and any other pretreatment systems required by the MDC, the NRC or the Boston WSC. Tufts and NEMC will adhere to all city, state and federal regulations regarding wastewater discharges. A discharge permit issued by MDC and a NRC radioactive materials handling permit will be renewed as required and all permit conditions will be followed.

Waste Management

No adverse environmental impacts are anticipated due to the management of solid, hazardous and radioactive wastes generated by Tufts and NEMC. Procedures currently practiced for handling of wastes will continue. Tufts and NEMC will continue to assure compliance with all applicable city, state and federal regulations, particularly regulatory requirements of NRC and those promulgated under RCRA and the Massachusetts Hazardous Waste Management Act. Tufts and NEMC will periodically evaluate waste generation statistics to determine if procedures can be implemented to reduce the amount of waste generated. It is not yet possible to estimate the increase in the amount of solid, hazardous and radioactive wastes with the additional facilities in 1985. However, the incremental increase is expected to be adequately handled by licensed contractors or by on-site facilities (e.g., incinerators). The characteristics of wastes generated by Tufts and NEMC are not expected to change significantly from current conditions.

3.7.2 1992 Environmental Conditions

Water Use

The increases in water use projected for 1992 are not expected to have any adverse impact on the City of Boston and MDC delivery systems. Water consumption by 1992 is expected to increase due to new building construction. By 1992, 5 new buildings will be added to the Tufts and NEMC complex. These include the Infill Building, Posner Research Building, the 1-C building, Tunnel Building and the NMR building. The amount of water use associated with these 5 new facilities is estimated to be about 650,000 cubic feet/year (about 5 million gallons/year). This represents an increase of about 21% over 1985 usage levels, bringing the annual total consumption to about 3,800,000 cf/year or about 28 million gallons/year. The projected 1992 usage represents an increase of about 60% over current usage. The increase will result in the total Tufts and NEMC water usage being about 0.06% of the current average annual City of Boston consumption and about 0.02% of the current annual MDC usage. The total Tufts and NEMC water usage projected for 1992 is considered to be insignificant when compared to existing City of Boston and MDC usages.

Wastewater Discharge

Increases in wastewater discharged to the City of Boston and MDC sewer systems by Tufts and NEMC in 1992 are not expected to result in any adverse impacts from a quantity or quality standpoint. The increase in the amount of wastewater generated by Tufts and NEMC in 1992 is assumed to be the same as the water consumption, about 5 million gallons/year. This represents about 0.005% of the average annual flow to the Deer Island Treatment Plant. The total amount of wastewater discharged (about 28 million gallons/year) will amount to about 0.03% of the current annual flow to the treatment plant, and about 0.02% of

the current design flow. The projected increase in wastewater from 1982 to 1992 (about 10 million gallons/year) is only about 0.04% of the increased daily flow that could be handled by the treatment plant (i.e., 62 mgd).

Waste Management

No adverse environmental impacts are anticipated due to the management of solid, hazardous and radioactive wastes generated by Tufts and NEMC. Procedures currently practiced for handling of wastes will continue.

4 MEASURES TO MITIGATE SIGNIFICANT ENVIRONMENTAL IMPACTS

4.1 IMPACT TYPOLOGY SUMMARY

The project actions comprising the Tufts and New England Medical Center Master Plan will result in distinct changes in the environmental conditions of the study area, relative to the conditions which would exist for the "No Action" alternative. The purpose of this report section is to summarize the results of the technical analyses described in Chapter 3 that were performed of the 1985 and 1992 Master Plan project development scenarios.

A typology of Master Plan generated environmental impacts is presented in Table 4.1-1. As documented in Chapter 3 and summarized in Table 4.1-1, the Master Plan development activity planned for the 1982 to 1985 timeframe is limited to three distinct project actions, Health Sciences Education Building, 15 Kneeland Street and 35 Kneeland Street. Due to the scale and nature of these projects, the impacts identified for 1985 represent only incremental changes from that which would result from the "No Action" alternative. In comparison, the Master Plan projects planned for the 1985 to 1992 period result in marked changes from the "No Action" alternative. This is primarily due to the cumulative conditions that result from the total spectrum of projects comprising the Master Plan.

TABLE 4.1-1

TUFTS AND NEW ENGLAND MEDICAL CENTER MASTER PLAN

ENVIRONMENTAL IMPACT TYPOLOGY

Environmental Discipline	Analysis Year	Major Environmental Impacts Identified	Potential for Environmental Significance*
Land Use	1985	• Coordination of Health Science Education Building design with St. James Church	1
		• Relocation of garment industry activity from 15 and 35 Kneeland Street	3
	1992	• Intensification of university and medical service activity density within existing complex boundaries	2
		• Design of Phase 1 of LC Project and Posner Research Building in manner compatible with neighborhood residential development	3
		• Integration of neighborhood commercial and facility needs with area development	1
Transportation	1985	• Maintenance of traffic flow during construction activity	2
		• Provision of additional parking spaces to accommodate increased user demand	2
	1992	• Affects of peak hour traffic increases on intersection operating characteristics	2
		• Adequacy of parking supply in relation to projected user demand	3
		• Provision of pedestrian movement through project area	1
Air Quality	1985	• Continued concentration of carbon monoxide due to indirect source emissions in excess of 8-hour ambient standards	2
		• Particulate emissions from construction activity	1
	1992	• Increase in stationary source emissions	2
		• Control of particulate emissions from construction activity	1
Noise	1985	• Construction noise intrusion due to equipment operation	2
	1992	• Construction noise intrusion due to equipment operation	2
Energy	1985	• Increased demand for steam, electricity and natural gas	1
	1992	• Ability of energy suppliers to meet cumulative increase in Tufts and NEMC demand requirements	1
Infrastructure	1985	• Capabilities of water and sewer systems to meet generated demand	1
		• Adequacy of solid waste and hazardous material disposal systems	1
	1992	• Capacity of water and sewer systems to meet cumulative Master Plan project demand	1
		• Projected demand on solid waste disposal	1
		• Efficiency of hazardous materials disposal systems	1

*KEY
1 - Minor potential for environmental significance
2 - Moderate potential for environmental significance
3 - Major potential for environmental significance

4.2 UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL IMPACTS

The determination of the significance of the Master Plan project related impacts is dependent on a number of key factors, the most important of which are summarized in Table 4.2-1. Depending upon the outcome of the likelihood of significance, the need for mitigation measures and commitment of resources can be determined.

In the context of 1985 Master Plan project development, the only impact listed in Table 4.1-1 that was identified as having a major potential for environmental significance was the relocation of the garment industry activity from 15 and 35 Kneeland Street. Impacts identified as having moderate potential for environmental significance include: (1) the maintenance of traffic flow during construction activity, particularly for projects fronting on Kneeland Street, (2) provision of additional parking spaces to meet the growth in user demand, (3) continued exceedance of 8-hour carbon monoxide standard due to indirect source emissions, and (4) construction noise intrusion.

In 1992 Master Plan project related impacts having a major potential for environmental significance include the compatibility of the 1C Project's Phase 1 development and the Posner Research Building with adjacent residential land uses, and the adequacy of the parking supply to meet expected user demand. Impacts identified as having a moderate potential for enviornmental significance include: (1) overall intensification of university and medical service activity density within existing complex boundaries, (2) effects of peak hour traffic increases on intersection operating conditions, (3) increase in stationary air quality source emissions and (4) construction noise intrusion.

4.3 IMPACT MITIGATION MEASURES

The measures identified in this section to mitigate potentially significant Master Plan project impacts consist of actions that are within the purview of either Tufts and New England Medical Center directly, or City of Boston agencies with project review or regulatory

TABLE 4.2-1

FACTORS DETERMINING ENVIRONMENTAL IMPACT SIGNIFICANCE

Planning Consideration	Weighting Factors for Impact Review
Impact characteristics	• Magnitude • Exposure - Land area - People • Timing - Initiation - Rate and frequency • Permanence
Adherence to environmental and land use standards	• Public health, welfare and safety criteria • Compatibility with existing land use activity
Consistency with public policy	• Master plan review • neighborhood goals and objectives

authority. Impact mitigation measures are presented by specific environmental discipline.

Land Use

For the 1985 Master plan projects, efforts have already been initiated by Tufts and New England Medical Center to mitigate the two land use related impacts. Tufts has been working closely with officials of the St. James Church during the design of the Health Sciences Education Building (HSEB). Given the site area required for the functional building design, the Rectory Building is to be relocated to the northeast corner of the site between the church and HSEB. The rectory will front on Harrison Avenue.

The City of Boston has initiated steps to minimize the impact of the dislocation of garment industry employment opportunities from the Kneeland Street - Stuart Street area. The Urban Development Action Grant (UDAG) for consolidating the garment industries at the Boston Army base prepared by the City has been given preliminary approval at the Federal level. The impact of the 15 and 35 Kneeland Street projects on garment industry employment opportunities should be alleviated to a great extent due to the proposed consolidation at the Boston Army base.

In a 1992 timeframe, both Tufts and New England Medical Center are planning to design the major project facilities with a sensitivity to land use concerns. Pertaining to the issue of increased university and medical service activity density, the following design principles have been formulated:

- Provision, wherever possible, of neighborhood oriented commercial and retail uses on the ground floor of new buildings;
- Development of walkways and wide sidewalks to facilitate pedestrian movement within and through the complex;
- Use of landscaping treatment and green areas to emphasize open spaces separating building structures;

- Provision of facilities to accommodate neighborhood meeting and recreation needs;
- Support of a housing policy that will assist Chinese neighborhood in providing adequate residential units; and

Because of their location along the boundary edge between neighborhood residential development and Tufts and New England Medical Center facilities, Phase 1 of the 1C Project and the Posner Research Building could potentially create conflicts due to scale and massing considerations. To minimize this potential impact, the Master Plan architects for NEMC and Tufts have proposed a stepped design for the Phase 1 1C Building along Oak Street and Posner Research Building along Tyler Street. Both buildings will have approximately the same height as adjacent residential development at their closest interface point, stepping up to their maximum heights on that portion of the site most interior to the medical complex proper. In addition, building facades would be designed in a manner compatible with existing neighborhood structures.

Transportation

In 1985, the major transportation issues relate to maintenance of traffic flow on Kneeland Street during the 15 and 35 Kneeland Street project construction, and provision of adequate parking supply to meet user demand. Construction related traffic impacts can be mitigated by proramming truck activity during off-commuter peak travel periods. For 15 and 35 Kneeland Street construction, curbside truck loading and unloading will be required. Whenever possible, truck activity should be scheduled to minimize queuing.

The parking policy formulated by Tufts and NEMC was detailed in the Master Plan Report document. In 1985, none of the existing parking supply has been dislocated due to building development. Through use

of leased spaces in private garage facilities, the parking demand projected for 1985 can be met.

The combined increases in peak commuter period traffic demand due to growth in through traffic movement and Master Plan project vehicle generation, is projected to result in periods of congested flow conditions at the Stuart Street - Tremont Street and Stuart Street - Kneeland Street - Washington Street intersections in 1992. The results of the traffic engineering analysis indicated that enforcement of No Parking regulations on intersection approaches, as they are currently signed, will reduce the severity and duration of potential intersection congestion. The use of off-site parking facilities planned by Tufts and NEMC will also help to reduce vehicle congestion at high volume intersections by spatially distributing vehicle generation due to employee travel.

The continued growth in parking demand by 1992 will require development of additional parking spaces to meet projected Tufts and NEMC needs. The spaces lost due to development of the Harrison Avenue and Oak Street surface parking facilities will be replaced by the garage facilty on he lower levels of the 1C Project (Phase 1). The additional parking demand will be met by development of an approximately 500 space off-site garage and the 100 spaces proposed for the Posner Research building. One site under consideration for the garage is in the vicinity of East Berkeley Street by the Dover MBTA station.

NEMC is developing a phased parking management program to ensure that visitor and patient needs are given priority. Employee and staff parkers will be directed to use the off-site parking facilities as the need arises.

Pedestrian movement within and through the Tufts and NEMC complex will be served by an integrated system of landscaped walkways and sidewalks. New project construction will also be set-back at the ground floor level to maximize the width of sidewalks. Growth in university and medical center pedestrian demand will also be

accommodated by the system of above grade connections being developed between buildings.

Air Quality

To mitigate the particulate emissions due to construction activity of Master Plan projects, the following strategies should be implemented for Tufts and NEMC project development:

- restriction of vehicle flow on unpaved surfaces;
- watering unpaved disturbed areas during periods of dry weather and high winds;
- minimizing the period during which cleaned and regraded site areas are exposed;
- minimizing the period when spoils are stored in the immediate vicinity of the construction site; and
- cover material with high propensity for airborne emission when transporting by truck.

The carbon monoxide concentrations attributable to vehicle emissions in 1985 will exceed the 8 hour standards. Concentrations projected for 1985, while above the ambient air quality standards, are lower than the concentrations computed for 1982 due to the higher percentage of catalyst controlled vehicles. With the continued introduction of the new vehicle models with air pollution controls, the carbon monoxide standards are met in 1992. Enforcement of on-street parking prohibitions on intersection approaches would help to improve the overall quality of traffic flow, resulting in a corresponding reduction in carbon monoxide emissions.

The stationary source emissions projected for 1992 are projected to increase slightly due to HVAC and incinerator operations associated with the new building construction. The normal air quality permits required by the Massachusetts Department of Environmental Qualty Engineering will help to ensure that the cumulative stationary source emissions will not present any public health problems.

Noise

The primary noise related impact is associated with construction equipment operation. The significance of project related construction noise impacts will be mitigated to a great extent by the restriction of construction activity to daytime hours when most residents are away from their homes. Second, the overall period of construction activity is limited in duration. Finally, because of the directional quality of noise, the facades of existing Tufts and NEMC Buildings will help to minimize the exposure of neighborhood residences to noise intrusion.

Energy

Based on discussions with Boston Edison, adequate system capacity is projected for 1992 to meet the electrical and steam requirements of Tufts and NEMC.

Infrastructure

The incremental change projected for water and sewer demand from the cumulative Master Plan project development in 1992 is well within the system capabilities for both services. The continued compliance of Tufts and NEMC with both NRC, RCRA and Massachusetts Hazardous Waste Management Regulations will ensure that no negative impacts are realized by either on-site hazardous material handling or monitored off-site disposal.

LIST OF REFERENCES

Boston Edison 1982. Personal communication, P. Davis, 17 September.

MDC Water Division 1982. Personal communication, T. Gawrys, 24 August.

MDC Sewer Division 1982. Personal communication, L. O'Shea, 25 August.

BWSC-Water Division 1982. Personal communication, S. Shay, 25 August.

BWSC-Sewer Division 1982. Personal communication, P. Wong, 25 August.

TECHNICAL APPENDICES

Appendix	Contents
A	Chronology of Public Agency Contacts
B	Traffic Count Data
C	Noise Measurement Procedures

APPENDIX A

CHRONOLOGY OF PUBLIC AGENCY CONTACTS

APPENDIX A

CHRONOLOGY OF PUBLIC AGENCY CONTACTS

Environmental Discipline	Agency Contact	Date	Discussion Topic
Land Use	BRA (B. Condo, D. Garver, M. Feischman)	7/29/82	Discussion of BRA's general planning objectives for the Chinatown-South Cove area; discussion of general issues surrounding development and historical change in the city.
	BRA (C. Mathieson)	8/17/82	Follow-up on earlier contact with BRA; as Chinatown planner, Carol could describe in greater detail development issues in the Chinatown/South Cove area, and could provide information in land ownership, use, zoning, BRA objectives, and area resources
	Boston Landmarks Commission (J. McDonough)	8/17/82	Review of files on historic structures in the T-NEMC area; discussion of historic resources; discussion of preservation objectives and a review of the inventory of historic structures in central Boston.
	Mass. Executive Office of Environmental Affairs - MEPA Unit (S. Mygatt, S. Vyterhoeven)	9/13/82 9/22/82	Discuss MEPA perspective on Master Plan goals and objectives.
Transportation	BRA (J. Greifeld)	8/16/82	Traffic Count Inventory
	Boston Traffic and Parking (R. Loring)	8/19/82	Traffic Count Inventory
	Central Transportation Planning Staff (A. Soolman, T. Lisco)	9/14/82	Traffic Forecast Information
	MBTA (D. Kidston)	9/14/82	Subway and bus service and patronage information.

Environmental Discipline	Agency Contact	Date	Discussion Topic
Air Quality	Mass. Department of Environmental Quality Engineering (H. O'Brien)	9/8/82	Background air emission data.
Noise	Boston Air Pollution Control Commission (G. Boehm)	9/2/82	Verify status of City of Boston noise regulations.
Energy	Boston Gas Company (W. Flaherty)	9/17/82	Gas demand and supply projections for Boston.
	Boston Edison Company (P. Davis)	9/17/82	Projected steam and electricty demand and system capacities for Boston.
Infrastructure	MDC-Water Division (T. Gawrys)	8/24/82	MDC water use and distribution system.
	MDC-Sewer Division (L. O'Shea)	8/25/82	MDC sewage distribution system and pretreatment requirements.
	Boston Water and Sewer Commission - Water Division (S. Shay)	8/25/82	City of Boston water use and distribution system.
	Boston Water and Sewer Commission - Water Division (P. Wong)	8/25/82	City of Boston sewage distribution system.

APPENDIX B

TRAFFIC COUNT DATA

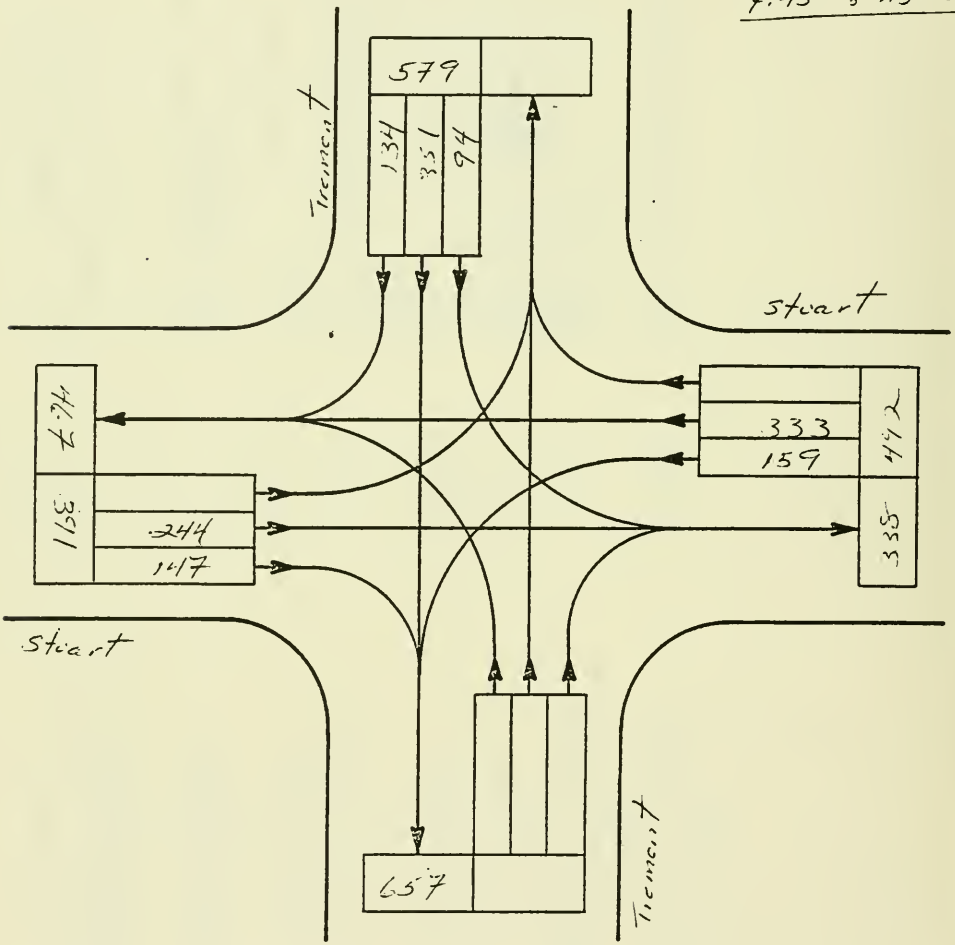
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
Concord, Massachusetts 01742

INTERSECTION TURNING MOVEMENT COUNT

CITY Boston, Mass. DATE 5/13/72 DAY of WEEK Wed

INTERSECTION Stuart @ Tremont

7.45 - 8.45 AM



STREET	ENTERING VOLUME	PERCENT of FLOW	LENGTH of COUNT	
			Time	Number of Hours
			VEHICLES COUNTED	
			ALL	XXX
TOTAL			TRUCKS	(XX)

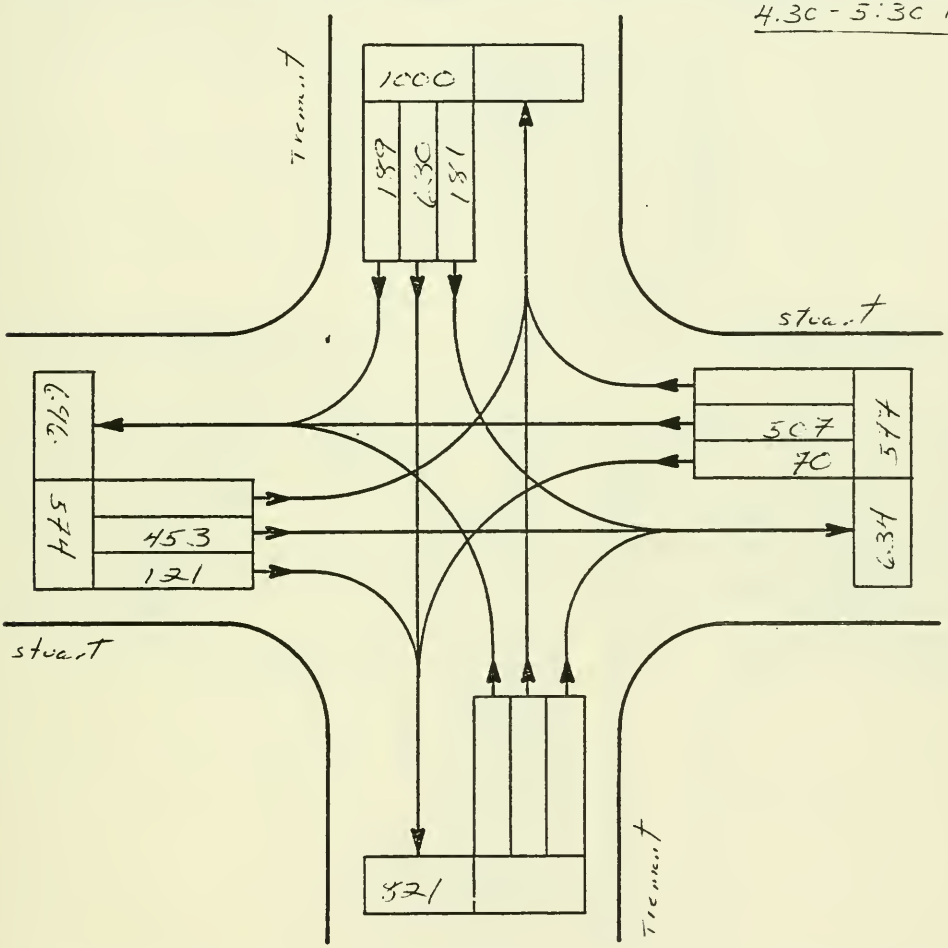
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
Concord, Massachusetts 01742

INTERSECTION TURNING MOVEMENT COUNT

CITY Boston, MA DATE 5/13/52 DAY of WEEK Wed

INTERSECTION Stuart & Tremont

4.30 - 5:30 PM



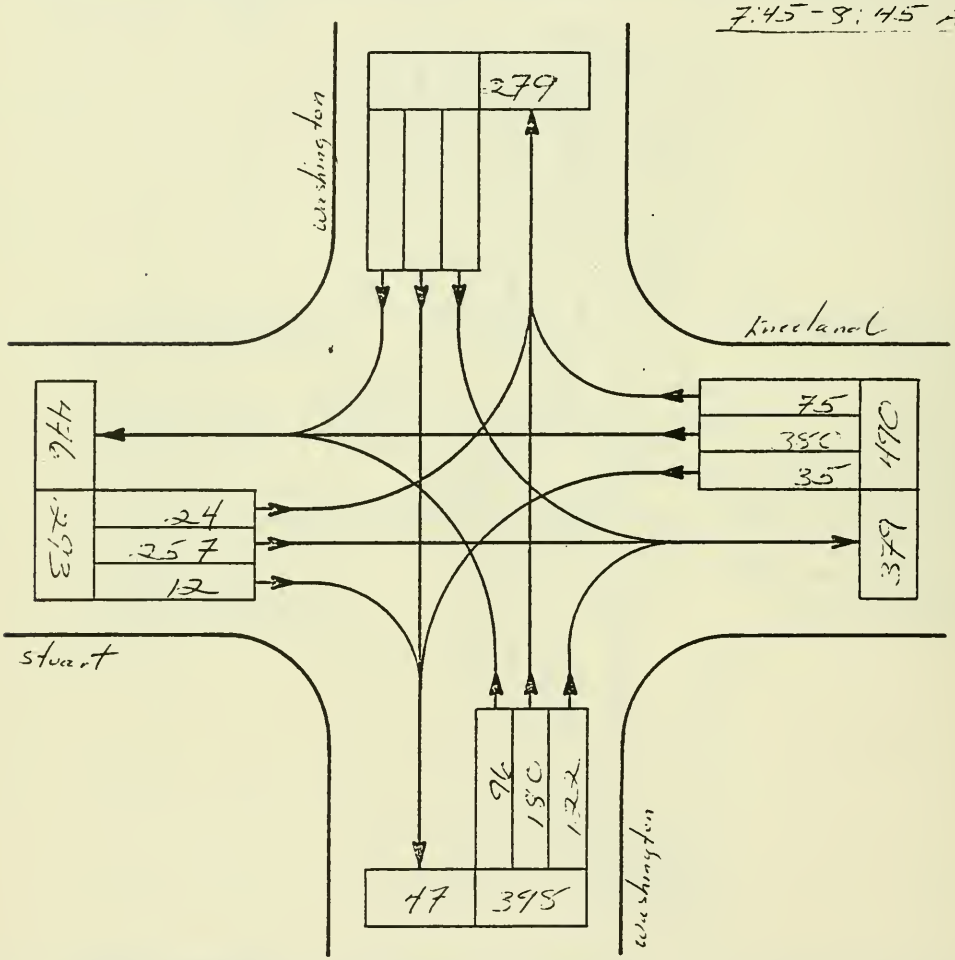
STREET	ENTERING VOLUME	PERCENT of FLOW	LENGTH of COUNT	
			Time	Number of Hours
			VEHICLES COUNTED	
			ALL	XXX
TOTAL			TRUCKS	(XX)

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
Concord, Massachusetts 01742

INTERSECTION TURNING MOVEMENT COUNT

CITY Boston, MA DATE 3/12/82 DAY of WEEK Tues
INTERSECTION Washington @ Stuart/Kneeland

7:45-8:45 AM



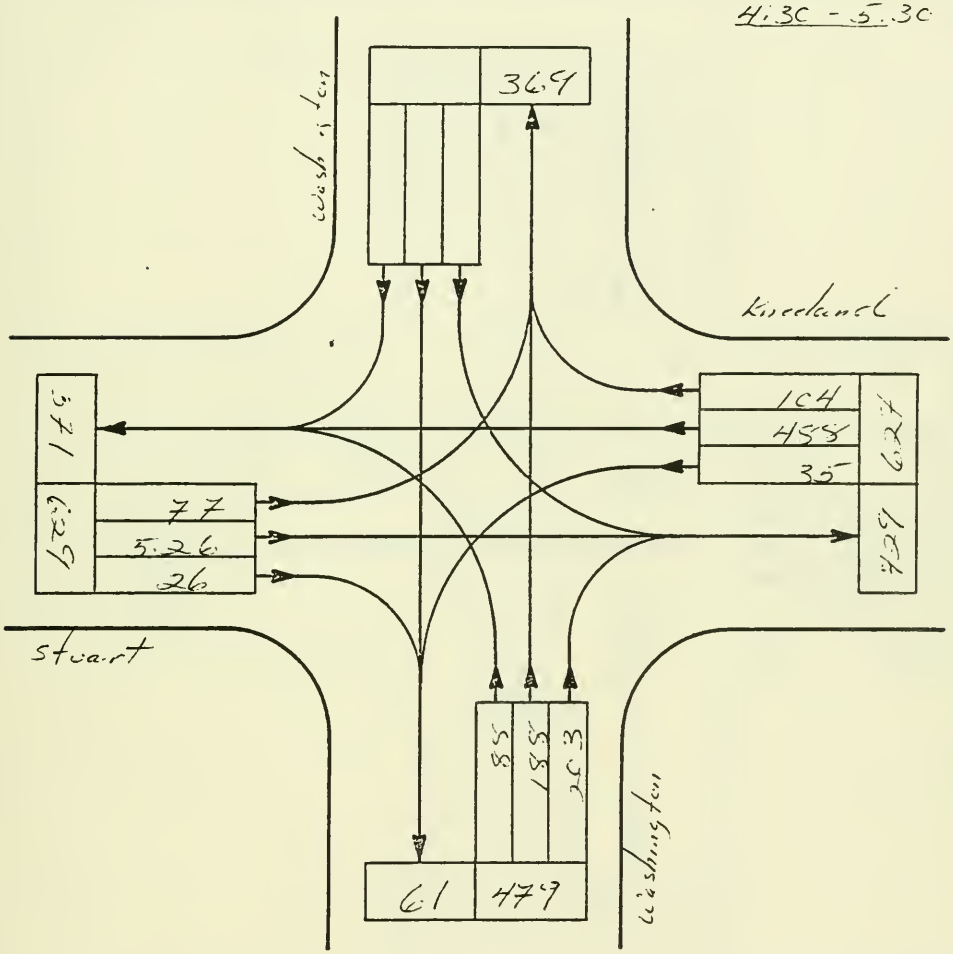
STREET	ENTERING VOLUME	PERCENT of FLOW	LENGTH of COUNT	
			Time	Number of Hours
			VEHICLES COUNTED	
			ALL	XXX
TOTAL			TRUCKS	(XX)

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
Concord, Massachusetts 01742

INTERSECTION TURNING MOVEMENT COUNT

CITY Boston, Mass DATE 5/17/82 DAY of WEEK Tues
INTERSECTION Washington @ Stuart / Kneeland

4:30 - 5:30 PM



STREET	ENTERING VOLUME	PERCENT of FLOW	LENGTH of COUNT	
			Time	Number of Hours
			VEHICLES COUNTED	
			ALL	XXX
TOTAL			TRUCKS	(XX)

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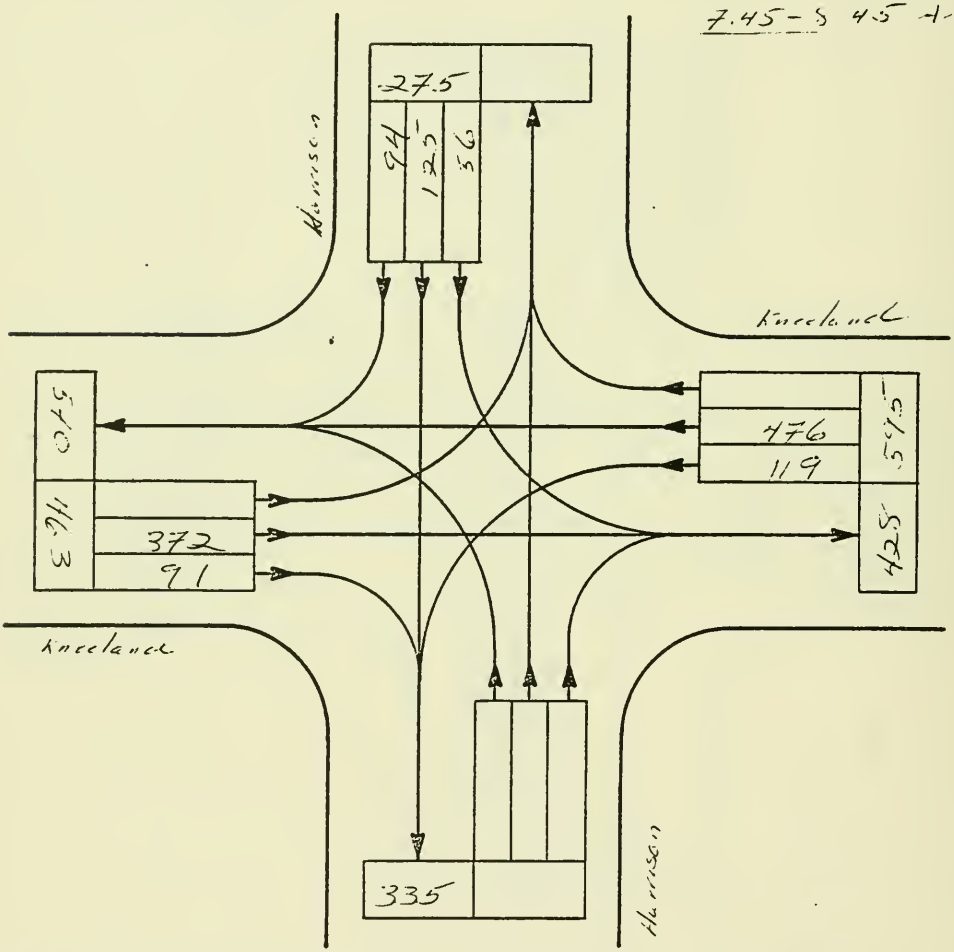
INTERSECTION TURNING MOVEMENT COUNT

CITY Boston, MA DATE 8/17/82 DAY of WEEK TUES
INTERSECTION Harrison & Kneeland

7.45 - 8 4.5 4.7



STREET	ENTERING VOLUME	PERCENT of FLOW	LENGTH of COUNT	
			Time	Number of Hours
			VEHICLES COUNTED	
			ALL	XXX
TOTAL			TRUCKS	(XX)

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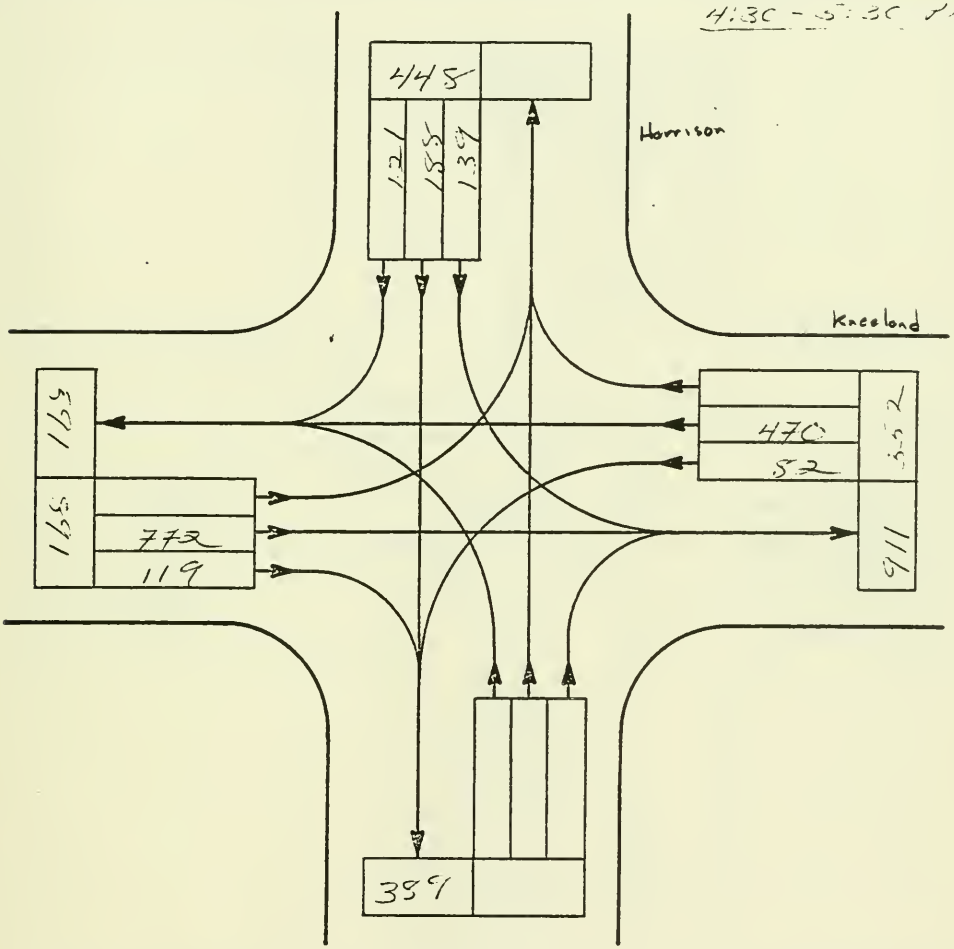
INTERSECTION TURNING MOVEMENT COUNT

CITY Boston, MA DATE 5/12/82 DAY of WEEK Tues
INTERSECTION Harrison & Kneeland

4:30 - 5:30 PM



STREET	ENTERING VOLUME	PERCENT of FLOW	LENGTH of COUNT	
			Time	Number of Hours
			VEHICLES COUNTED	
			ALL	XXX
TOTAL			TRUCKS	(XX)

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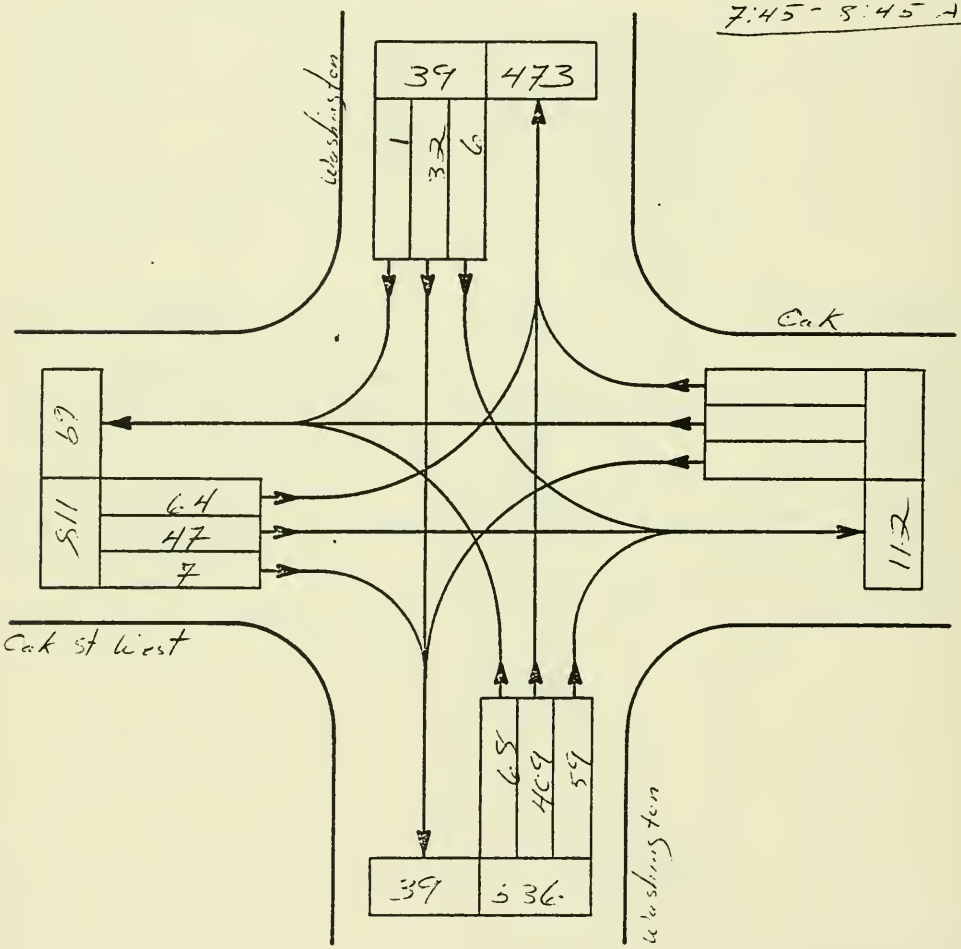
INTERSECTION TURNING MOVEMENT COUNT

CITY Boston MA DATE 5/18/82 DAY of WEEK WED
INTERSECTION Oak & Washington

7:45 - 8:45 AM



STREET	ENTERING VOLUME	PERCENT of FLOW	LENGTH of COUNT	
			Time	Number of Hours
			VEHICLES COUNTED	
			ALL	XXX
TOTAL			TRUCKS	(XX)

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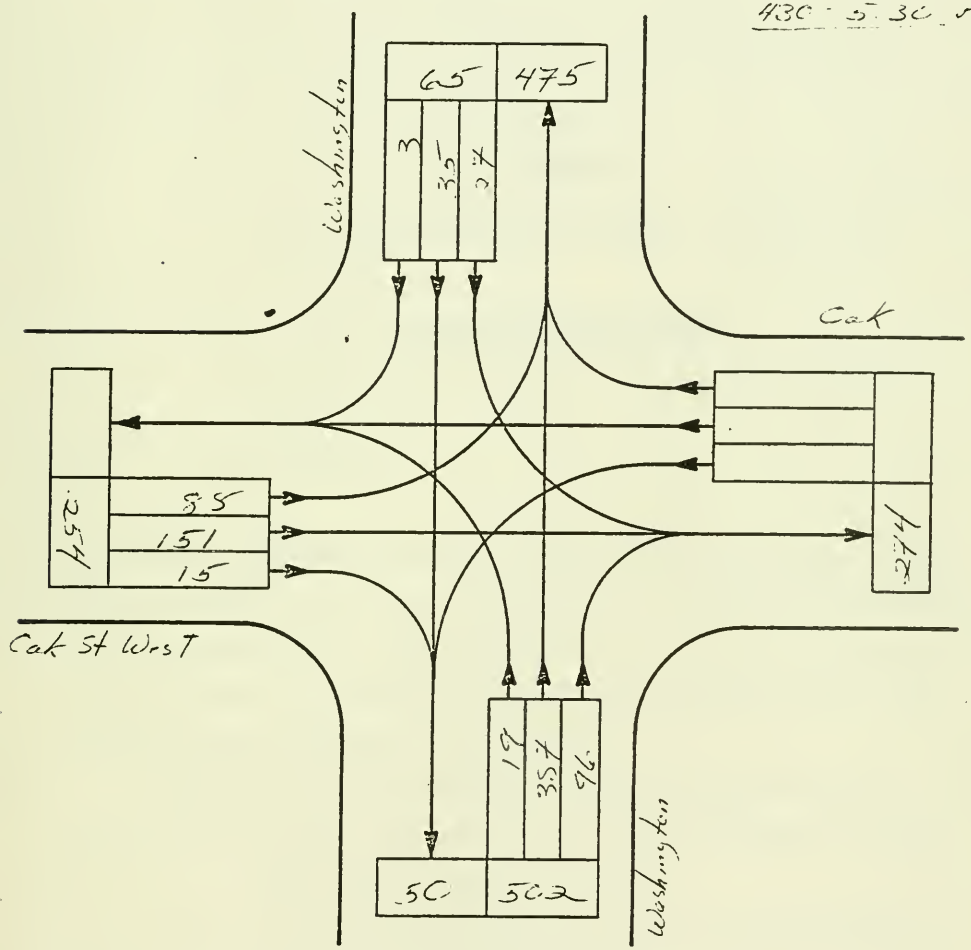
INTERSECTION TURNING MOVEMENT COUNT

CITY Boston, MA DATE 5/15/52 DAY of WEEK WED
INTERSECTION Oak to Washington

430 - 5:30 PM



STREET	ENTERING VOLUME	PERCENT of FLOW	LENGTH of COUNT	
			Time	Number of Hours
			VEHICLES COUNTED	
			ALL	XXX
TOTAL			TRUCKS	(XX)

APPENDIX C

NOISE MEASUREMENT PROCEDURES

APPENDIX C

NOISE MEASUREMENT PROCEDURES

The basic instrumentation used to obtain A-weighted noise-level statistics was the BBN Instruments Company Model 614 portable noise monitor system. Accessory equipment included:

- B&K 4230 sound-level calibrator,
- 0.5-inch electret condenser microphone (Type 1962-9601) (flat random-incidence response),
- windscreen,
- a 100-foot microphone extension cable,
- tripod (microphone elevation approximately 1.5 meters), and
- headphones.

The BBN 614 measurement threshold is approximately 30 dBA, with a dynamic range of 100 dBA (plus a 10 dBA crest factor). The output data consist of the time period (15 to 30 minute) statistics L_{eq}, L_{max}, L_1, L_{10}, L_{50}, L_{90}, L_{99} (see Table 3 in Appendix A-1), automatically printed on paper tape with time and calibration signal information.

For the octave band measurements, a GenRad Type 1933 precision sound-level meter and analyzer was used. Assessory equipment included:

- Type 1562-A sound-level calibrator,
- a 1-inch electret condenser microphone (Type 1961-9601) (flat random-incidence response),
- windscreen,
- a 60-foot microphone extension cable,
- tripod, and
- headphones.

Octave band noise levels were obtained at each measurement location by noting the minimum sound pressure levels in each band during a 5-minute observation period.

Fully documented quality assurance procedures have been followed during all field noise measurements. These procedures detail instrument placement, setup, calibration, verification of proper operation, care of data, and instrument takedown. Examples of these procedures follow:

- Instruments (including microphones) are calibrated before and after measurements.
- A microphone windscreen is used at all times. No measurements are taken when local wind speeds exceed 10 to 12 mph.
- An instrument's AC output is monitored by the operator after setup and periodically during each measurement period to ensure proper operation.
- Wind speed (dyer wind speed meter), wind direction, temperature, and relative humidity measurement (Taylor Instruments sling psychrometer) are recorded in data log.

When the A-weighted noise levels were within the range of the BBN-614 instrument's noise floor, the GenRad 1933 was used to confirm and measure the background noise levels. The minimum measurable noise level (considered as a level 5 dB above the absolute noise floor) of the GenRad 1933 instrument is approximately 22 dBA.

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